

# COMPUTERWORLD

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## Packet Nets Grow

## Transpac Makes Its Formal Bow

By Ronald A. Frank  
CW Staff

PARIS — Transpac, the fourth major nationwide public packet-switched network, officially became operational last week during ceremonies sponsored by the French postal, telephone and telegraph (PTT) authority.

The formal dedication of the network was held first at PTT headquarters here in Paris and a short time later at the network management center in Rennes, the capital of Brittany.

Ceremonies in Rennes were marred by pickets who massed outside the center. The demonstrators were believed to be PTT employees, unemployed workers and students who feared the shift to the digital network was a prelude to layoffs of workers who assemble the electromechanical (Continued on Page 6)

## If They Rent or Lease IBM Upkeep Fees Sock 4300 Users

By E. Drake Lundell Jr.  
CW Staff

WHITE PLAINS, N.Y. — Users who rent or lease IBM's recently introduced 4300 computer systems will not receive the traditional IBM 24-hour-a-day, seven-days-a-week maintenance service — unless they want to pay extra for it.

Buried along with all the other policy changes in the IBM 4300 announcement was the news that the machines will be placed on Plan D maintenance service. Plan D provides "free" service only nine hours a day, five days a week.

Any other maintenance service on the machines will be available for "optional" periods (see accompanying chart). It will cost 4341 users, for example, at least \$600/mo more to receive 24-hour, seven-days-a-week service on a relatively small system.

The only other equipment announced previously by IBM that falls under the Plan D schedule for limited maintenance appears to be the 8100 Information System.

In the past, all users who rented or leased equipment from IBM received around-the-clock service as part of the monthly price. Users who purchased equipment could receive similar maintenance service by contracting with IBM for a basic monthly charge.

Under the new plan, however, only limited service is available as either

part of the rental or lease fee or under the basic maintenance contract for purchased equipment. The additional service will be available at varying rates depending on the system type and the time that coverage is desired, with the rates being higher on week-ends than during the week.

In addition to the 4300 central processors, all peripherals announced with the 4300 system will also only be maintained under the Plan D schedule.

Under the plan, each piece of IBM equipment is graded into one of four "machine groups" (A, B, C or D) and

maintenance is available for any one of five periods outside the basic service period.

Users who rent or lease can receive the base period of maintenance at no additional cost. Purchase customers receive the base maintenance under their monthly contract.

That base period must be nine consecutive hours between 7 a.m. and 6 p.m. Monday through Friday. The user must choose in advance the nine hours out of those 11 hours for which coverage is to be provided.

(Continued on Page 8)

## Did DP Controls Work During Reactor Shutdown?

By E. Drake Lundell Jr.

CW Staff

HARRISBURG, Pa. — Confusion continued here late last week over whether computerized controls worked properly during the shutdown of a nuclear power plant during which a large amount of radioactivity was released into the air.

A malfunction in the cooling system at General Public Utilities Co.'s Three Mile River plant 15 miles from here led to the shutdown of the reactor and the release of radioactivity.

At a hastily called press conference in

nearby Hershey, officials of Metropolitan Edison, which runs the plant for a utility consortium, told 200 reporters that the shutdown procedure was "not completely computerized." However, they did not elaborate on how well the automatic system functioned during the crisis.

And while increased radiation levels were measured as far as 16 miles from the plant site after the accident, officials of the company and the Nuclear Regulatory Commission (NRC) claimed that the increased radiation constituted only a "low level" of exposure.

But the radiation levels within the containment building surrounding the reactor were understood to be "extremely" high. Even after the initial release of radiation, seepage occurred through the plant's four-foot-thick concrete walls, officials said.

The major health effects of the malfunction will probably come in the form of increased levels of radioactive iodine in milk from the dairy herds which dot the countryside here, state officials indicated.

The accident happened when two pumps and a valve in the plant's cooling system failed at about 4 a.m. on (Continued on Page 6)

## Honeywell Adds Large Processors

By a CW Staff Writer

WALTHAM, Mass. — Four processors that bracket the IBM 4331 and 4341 in performance and price were announced here last week by Honeywell, Inc.

On the low end of the line, Honeywell introduced the Level 64 Distributed Processing System (DPS)-320, which it said is about equal to the 4331 in price and performance, and the Level 64 DPS-350, which has about 70% greater performance.

At the higher end of the line, the firm said the Level 66 DPS-440 is "somewhat" under the IBM 4341 in both price and performance, while the DPS-520 provides about 1.5 times the performance of the DPS-440.

In addition, the firm introduced a Datanet front-end processor and a system console for the DPS-440 and DPS-520.

Remote maintenance, command and inquiry software and interactive Basic were also announced for the DPS-320 and DPS-350.

### Compatible With Level 6

The four DPS systems all work in Honeywell's Distributed Systems En-

vironment as hosts or co-hosts and offer software compatibility with the firm's Level 6 minicomputers.

The basic memory size for the Level 64 DPS-320 and DPS-350 is 512K bytes. The memory can be field-upgraded in 256K-byte increments to 1M byte on the DPS-320 and to 2M bytes on the DPS-350.

The price for the 256K-byte module is \$142/mo on a five-year lease or \$5,920 to purchase. The price of 1M byte is therefore \$23,680, compared

with IBM's price of \$15,000.

Using 16K-bit chips, the memory cycle times for the DPS-320 machine are 1 msec to 860 nsec for a 4-byte read and 1 msec to 980 nsec for a 4-byte write. The memory cycle times for the DPS-350 are 860 nsec to 680 nsec for a 4-byte read and 980 nsec to 880 nsec for a 4-byte write, Honeywell said.

The machine cycle times are 500 nsec to 430 nsec for the DPS-320 with two power modules and 430 nsec to 340 (Continued on Page 4)

## DP Strikes Help Topple UK Government

By Rex Malik  
Special to CW

LONDON — Increasing strikes by government DPers here were one reason Prime Minister James Callaghan's Labor government failed to get a vote of confidence by one vote last week.

The two major unions that have been selectively shutting down government DP centers for the past month [CW, March 26] rejected a government pay raise offer of 7% last Monday — just two days before the confidence vote — and stepped up their strike actions

against the government.

DPers at the nation's Inland Revenue Service (the UK tax-collecting agency) appeared to join the job actions, which could hurt the government's revenue-collecting efforts.

The independent union covering DPers at Inland last week banned all work on the nation's budget, which was due by April 1, and also banned all overtime work at the DP center. Overtime is considered critical since the operation is said to be understaffed almost 20%.

The Inland union called a meeting for last Friday to discuss methods by which it could slow the delivery of revenues to the Exchequer, or treasury department.

### Strike Stepped Up

The two unions originally involved in the strike — the Society of Civil and Public Servants and the Civil and Public Services Association — stepped up their strikes of computer centers, adding two centers to the list of 36 al- (Continued on Page 8)



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## This Time: \$1.1 Million Wire Fraud Hits Another Calif. Bank

By Jeffrey Beeler

CW West Coast Bureau  
**BEVERLY HILLS, Calif.** — Like earthquakes, illegal wire transfers continued to shake southern California last week as the Federal Bureau of Investigation issued arrest warrants for two men accused of fraudulently wiring \$1.1 million from City National Bank here to New York City banks.

The alleged theft by City National employee Michael Jason Kelley, 25, and his former roommate, Richard Albert Warren, 37, brought to three the number of wire fraud schemes that have hit the Los Angeles area during recent months.

Last October, FBI agents arrested computer consultant Stanley Mark Rifkin for illegally transferring \$10.2 million from nearly Security Pacific National Bank to Irving Trust Co. in

New York City. Two days before he was scheduled to go to trial for the first offense, Rifkin was arrested again following an abortive attempt to rob the same Los Angeles bank of another \$50 million.

## Striking Parallels

Local law enforcement authorities noted several striking parallels between Rifkin's computer-aided bank heist and the latest reported wire fraud scheme.

Like Rifkin, Kelley and Warren allegedly obtained secret computer passwords to make unauthorized electronics funds transfers between West and East Coast banks. Like Rifkin, they also apparently intended to use the stolen money to buy diamonds.

But unlike Rifkin, Kelley and Warren remained at large, despite what one lo-

cal FBI spokesman termed an "aggressive" effort to nab them.

City National's general counsel James Del Guercio refused last week to discuss how his bank uncovered the alleged fraud or to describe exactly how the fugitive pair purportedly transferred their stolen funds. He even declined to reveal the kinds of computer hardware involved in the scheme, and representatives of both the U.S. Attorney's Office and the local FBI branch proved equally unwilling to comment.

Nevertheless, a hazy outline of the alleged wire fraud emerged last week from a handful of verifiable facts.

Local authorities suspect the fraud plot consisted of three wire transfers. The first transaction apparently took place on March 13 and involved the transmission of \$100,000 from the account of Osterloh and Durham, Inc., a local insurance broker, to Warren's account at Chase Manhattan Bank.

Both of the other transfers, which presumably occurred about three to six days later, involved the wiring of \$500,000 from the account of Paradise Plaza to the account of Kohinoor International Ltd., a New York City diamond dealer.

Warren is believed to have contacted Kohinoor while posing as a liaison for a group of investors interested in buying diamonds.

Kelley, who was last seen at work on March 16, apparently had access to wire transfer passwords in connection with his duties as secretary to vice-president.

City National officials discovered the alleged thefts when "bank control procedures" revealed a \$100,000 wire transfer that Osterloh and Durham had never authorized.

Subsequent records checks soon uncovered the two other fraudulent transmissions.

## Rifkin Gets Eight Years

By Tim Scannell

CW Staff  
**LOS ANGELES** — Rejecting a defense appeal that Stanley Mark Rifkin be placed on probation so he could teach bank officials how to avoid computer fraud, Federal District Court Judge Matthew Byrne Jr. last week sentenced the 33-year-old computer analyst to eight years in prison.

A prison term would be a "far more effective deterrent than all the lectures he could give," Byrne stated as he handed down what could have been a 10-year sentence.

Rifkin recently pleaded guilty to charges that he manipulated the Federal Reserve System's electronic funds transfer network, Fedwire, to steal \$10.2 million last year from the Security Pacific Bank here [CW, Feb. 26].

Rifkin was originally charged with

smuggling, interstate transportation of stolen property, entering a bank to commit a felony and two counts of wire fraud. However, the first three counts were dismissed upon recommendation of the U.S. Attorney's Office, leaving just the wire fraud charges.

A few weeks ago, while out on bail, Rifkin was arrested for allegedly trying to hatch a second computer-based scheme that would have involved the electronic transfer of \$50 million from the Union Bank in Los Angeles to a San Francisco branch of the Bank of America [CW, Feb. 19]. Although there were indications that the scheme was engineered by a informer for the federal Drug Enforcement Administration, hinting of entrapment, Rifkin reportedly agreed to plead guilty to the Security Pacific affair if charges were dropped for the second bank theft.

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# WALLPOSTER

## Honorable DOS sort users: Beware outmoded "Gang of Four."

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COMPUTER SYSTEMS Inc. 560 Sylvan Ave., Englewood Cliffs, N.J. 07632

Gosh, IBM must love DOS sort programs. It makes so *many* of them!

Just in case you've lost track, there are *four* at present. There used to be a fifth, but we understand it's been withdrawn. (Doing a little "rehabilitation" on a farm someplace?)

Here are the IBM survivors, arranged in two columns in keeping with ancient Chinese custom:

Column A	Column B
5746-SM1	5743-SM1
5746-SM2	SM-483

Sure, you can choose one from Column A and one from Column B if you want. But all you'll be doing is substituting quantity for quality. And that's a risky business in any kind of software selection.

None of IBM's sorts—either collectively or individually—can compete with SyncSort DOS on a performance basis. The reason is that the technology underlying the "Gang of Four" is somewhat weak in the knees.

Most of the breakthroughs in sort technology were made in OS/VS. They were pioneered by us and incorporated in a long line of SyncSort OS releases.

When it came time to design SyncSort DOS, we simply translated those breakthroughs over into the DOS/VS idiom. For the first time all OS and DOS sort users were created equal. Provided, of course, that they used SyncSort.

**Compared with any or all of IBM's four sorts, SyncSort DOS will yield computer-resource savings that look like this:**

- 30-40% reduction in Elapsed Time;
- 30% reduction in CPU Time;
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But please don't take our word for any of this. Be coldly pragmatic. Run a benchmark comparing SyncSort DOS with any of the "Gang of Four" on identical file characteristics. The results should convince you that quantity is no substitute for quality.

Or, as our favorite Chinese detective said to his bumbling son recently on the late, late show: "Ambitious person who set out to chase more than one rabbit often end up catching none."

# When Independent Gear Added NCR Backs Off on \$3,000 Reinitialization Fee

By E. Drake Lundell Jr.  
CW Staff

DAYTON, Ohio — Faced with strong user resistance, NCR Corp. has backed off from a policy that would have charged users exorbitant fees for firmware reinitialization if the users chose peripherals or software from independent vendors.

The firm admitted last week it had told customers they would have to pay \$3,000 for reinitialization services if they bought equipment from independent vendors, but said the fee had never actually been collected.

Instead, the firm now says it will charge users for reinitialization only on a time and materials basis, estimating that such charges would be in the "hundreds of dollars."

The firm last week also clarified its policy on maintaining NCR equipment with independent peripherals — another source of concern and confusion for several users who have been considering independent gear for their systems.

## Reinitialization Process

Reinitialization is the process by which firmware is updated to reflect a system's current peripheral mix. Each time a peripheral is added to or deleted from the system, the firmware must be updated to reflect that change.

Firmware reinitialization is free if users stick with NCR peripherals instead of going to independent devices. Sources outside NCR indicated this is a "rather simple procedure" that takes 10 to 15 minutes of a field engineer's time.

Therefore, several users who were looking at NCR-compatible equipment from independent suppliers — and who did not want to be identified — were upset when NCR announced the \$3,000 charge for reinitialization late last year.

The \$3,000 fee may, in fact, have caused several to shy away from purchasing independent equipment, industry sources said, even after they had indicated an intent to buy the gear.

## Maintenance Policy

Another point of contention with

NCR has been its policy toward maintaining systems with independent peripherals. Several users indicated NCR salespeople had informed them that they might lose service if they went to the independent equipment or that they might have to pay higher prices for their maintenance if they went the independent route.

Such threats were "rather vague," in the words of one user, but nevertheless had the effect of making users leery of going to the independent gear.

However, in a statement issued last week, NCR promised that "it is NCR's intent to fully support our customers in the use of NCR equipment."

The firm did note it does not "Intend to support non-NCR equipment added

by third parties to NCR systems nor can we support unauthorized modifications made by third parties to NCR equipment."

## Maintaining Rights

Whenever non-NCR equipment or software is added to an NCR system, the firm said, it "maintains the right to inspect the system" to see if the alteration affects the safety of the equipment, "in any way" interferes with the system's ability to function or increases the cost of maintenance.

If the alteration is found to cause excessive costs, NCR said it will continue to maintain the system on a time and materials basis, but will not maintain the equipment if the alterations cause a

safety problem.

Guy Cimo, president of Computer Enhancement Corp., one of the major suppliers of non-NCR equipment to NCR customers, indicated last week that independent equipment should not cause excessive costs for NCR maintenance and would not represent a safety hazard to the systems.

The statement is much like one IBM made in an out-of-court settlement when it agreed to maintain its systems on a "best efforts" basis when independent equipment was attached to an IBM system.

In the years since that settlement, IBM users with independent gear have reported few problems with maintenance from IBM.

# Honeywell Adds Four Level 64 Systems

(Continued from Page 1)

nsec for the DPS-350 with its single power unit, a spokesman stated.

The memory read cycle times to the bus for both the DPS-440 and the DPS-520 processors on a 2-word (72-bit word) fetch are 375 nsec — not using the machines' interlacing capability, which would lower the cycling speeds. However, if the 520's cache is used during the fetch process, the memory cycle time would be reduced to 270 nsec, the spokesman said.

Since the DPS-440 and 520 are asynchronous, containing no internal clock, the machine cycle times are dependent upon the individual execution times of the instructions, he noted.

## Low-End Machines

A DPS-320 can be upgraded in the field to a DPS-350 or to any other members of the Level 64 family. Both of these units have an integrated communications controller capable of supporting up to 14 communications lines. Each line can support 16 CRT or printer terminals, the firm said.

The Gcos operating system comes bundled with the systems, the spokesman added.

The Query Driven System software announced with the systems is said to provide end users with a command

and inquiry capability for report building via English-like commands. The terminal-oriented facility operates in an interactive mode for terminal-based file browsing and updating.

Other standard features of the units include an integrated mass storage processor capable of attaching up to eight 100M-byte or 200M-byte disks, an integrated unit record processor for attaching printers and card equipment, a console and a 30 char./sec console printer.

Remote maintenance service, called RMS/64, is also available with the systems. Under this service, the systems can be diagnosed and maintained from one of two Honeywell Level 64 "tactical centers" in Atlanta, Ga., and Wellesley, Mass. Users can contact the centers for free consultation through an 800 number.

The DPS-320 costs \$2,061/mo on a five-year lease; its purchase price is \$81,360. The DPS-350 leases for \$3,800/mo and sells for \$155,232.

First customer shipments of the DPS-320 will be in the second quarter; the DPS-350 will be shipped in the third quarter.

## High-End Mainframes

On the high end, the DPS-440 consists of the CPU, one system control unit (SCU) and one I/O multiplexer (IOM) with 18 channel function slots. Two versions of the DPS-440 are available, one with 1M-byte of 16K MOS memory, the other with 2M-bytes.

The existing Level 66 DPS communications and peripheral subsystems are available with the DPS-440, and a maximum of two Datanet front-end network processors and two systems consoles are supported.

The DPS-440 can be field-upgraded to the DPS-520. The DPS-520 is configured similarly to the DPS-440 — with one CPU, one SCU and an 18-slot IOM. Memory ranges from 1M to 4M bytes. The 4M-byte version includes an expanded 27-slot IOM.

As with the DPS-440, existing Level 66 DPS communications and peripheral subsystems are available on the DPS-520. The DPS-520 is field-upgradable to the existing Level 66 DPS line.

## Network Processor

The Datanet 6641 front-end network

processor provides network communications power for both the DPS-440 and the DPS-520. The Datanet 6641 is compatible with system software and user-generated programs of the Datanet 6600 family of front-end network processors, the firm said, adding that the unit operates asynchronously under firmware control.

A basic unit includes 64K bytes of memory and has the capacity for an additional 64K bytes. It can be field-upgraded to the performance power of the Datanet 6651.

Honeywell's CSU 6601 system console for the DPS-440 and DPS-520 is a free-standing unit which features a 12-in. CRT display, 120 char./sec printer and interactive message transfer capability.

The basic DPS-440 central system costs \$198,338. It can be leased for \$4,591/mo. The monthly maintenance fee is \$901. A 2M byte DPS-440 sells for \$265,397 and leases for \$6,114/mo. The monthly maintenance fee is \$1,123.

A basic DPS-520 central system costs \$371,316 and leases for \$8,079/mo. Its monthly maintenance fee is \$1,643.

The 2M-byte version of the DPS-520 sells for \$416,066 and leases for \$8,961/mo. The maintenance charges are \$1,788/mo. The 4M-byte version sells for \$466,831, leases for \$10,058/mo and has a maintenance charge of \$1,833/mo.

The CSU 6601 system console costs \$9,895 and leases for \$256/mo. Maintenance costs are \$86/mo.

A 64K-byte Datanet 6641 front-end network processor sells for \$48,805 and leases for \$1,329/mo. Maintenance costs are \$249/mo.

Both the DPS-440 and DPS-520 will be available during the first quarter of 1980. The Datanet 6641 and the CSU 6601 also will be available at that time, Honeywell said.



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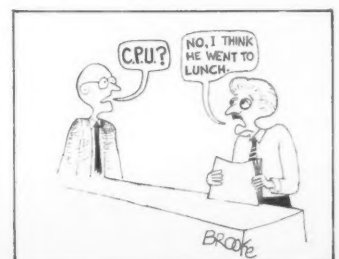
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# House Bill Would Allow Carriers to Offer DP

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — All common carriers — including AT&T — would be allowed to offer data processing services under a new communications bill introduced in the House of Representatives here last week.

In addition, the bill would immediately deregulate all intercity carriers, except AT&T, deregulate all terminal equipment and replace the Federal Communications Commission with a more streamlined regulatory agency.

Introduced by Rep. Lionel Van Deerlin (D-Calif.), Chairman of the House Communications Subcommittee, the Communications Act of 1979 is more sweeping than a similar bill introduced a few weeks ago by Van Deerlin's Senate counterpart, Ernest Hollins (D-S.C.) [CW, March 19]. However, the latest House version of the Communications Act of 1934 drops a provision in the original rewrite, introduced last year, that called for AT&T to divest itself of its Western Electric manufacturing arm.

The 1979 bill would replace the FCC with a Communications Regulatory Commission (CRC), described as a body of five commissioners appointed by the President to nonrenewable 10-year terms.

## Limits on AT&T

Van Deerlin told a Thursday morning press conference that he feels there are now other ways of realizing the benefits of deregulation without attempting to restructure the telecommunications industry.

As an alternative, AT&T and its affiliates would be required to deal with each other "on an arm's-length basis," he said.

Any products or services Western Electric offers to the Bell System would have to be offered to other carriers on the same terms. The bill would override the restraints imposed on AT&T and Western Electric by the 1956 Consent Decree, allowing it to compete in new markets including data processing.

The basic goal of the legislation is to provide for telecommunications services that are "universally available at affordable rates," Van Deerlin said. The bill states that "competition shall be relied upon to the maximum extent possible to determine the variety, quality and cost of telecommunications."

The CRC would be authorized to regulate interstate and foreign telecommunications only when "marketplace forces fail to protect the public interest."

Among other things, the bill would also:

- Establish a National Telecommunications Agency as an independent entity in the executive branch. The agency, charged with developing and implementing a national telecommunications policy, would replace the Commerce Department's National Telecommunications and Information Administration.

- Deregulate all intercity (interexchange) services except those provided by "dominant carrier" (defined so as to apply only to AT&T at present) and provide for unregulated resale and shared use of facilities or services obtained from a dominant carrier.

- Limit state regulation to basic voice

telephone service, deregulating all other services offered by local telephone companies.

- Allow carriers to provide any telecommunications services or facilities incidental to telecommunications, including all terminal equipment, and data transmission.

Van Deerlin told the press conference he believes the bill has a good chance of being passed by the end of the year. Noting this is the second session of Congress in which the legislation has been introduced, he said, "There isn't going to be another one; this is the one that is going to move."

The bill is co-sponsored by Rep. James M. Collins (R-Texas), the ranking minority member of the Communications Subcommittee. This bipartisan support for the legislation and recent indications of Administration support will help ensure passage of the legislation, Van Deerlin said.

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## Did DP Controls Work During Reactor shutdown?

(Continued from Page 1)

Wednesday. This caused the interruption of the water flow that takes heat away from the reactor.

When this happens, the reactor is normally shut down automatically, a procedure called "scramming." However, early reports last week indicated that the system may not have been scrambled for as long as a minute after the cooling water stopped flowing. The procedure should be almost instantaneous.

Moreover, even after a reactor is shut down, it continues to generate heat, so water has to be retained around the reactor to keep it cool.

While the exact sequence of events was not known at press time, it appeared that the plant's operators had to resort to a manual method of emergency cooling for the reactor, which led some sources to believe that the automatic, computer-controlled primary system either didn't work or did not supply enough water to keep the system cool.

Meanwhile, the increasing heat levels apparently caused a buildup of pressure within the cooling system and reactor core. When the pumps failed, the radioactive water backed up into a holding tank which ruptured, officials said. The overflow from this tank was sump-pumped into an auxiliary building.

Most of the radioactive contamination came from this source, according to officials, although eyewitnesses reported that a 1,000-foot-high cloud of steam escaped from the plant as it was being shut down. The officials said they did not realize that radiation was being emitted from the auxiliary build-

ing until almost three hours after the problems began.

It also appears that the system was not fully stabilized until almost 14 hours after the initial malfunction, and some members of the Union of Concerned Scientists said the problems may not be over since the system could become unstable once again.

### Damage to Reactor Rods?

The high levels of radiation seeping out of the plant's walls has led several officials to believe the accident caused damage to one or more of the reactor's nuclear fuel rods. The company estimated that 1% of the rods was damaged.

"We think there would have to have been damage to fuel rods in order to obtain the readings we've gotten outside the plant," an NRC spokesman said.

This may make it more difficult to bring the heat and radiation levels down to acceptable levels so people can enter the plant and determine exactly what happened with the system.

The accident is clearly the most serious that has ever happened around a commercial atomic power plant in terms of the degree of radiation released into the atmosphere.

In 1966, the automatic control systems apparently did not work well at the Enrico Fermi fast breeder reactor outside of Detroit, which almost led to a meltdown of that reactor's core, according to the book *We Almost Lost Detroit* by John G. Fuller. Radiation was not released in that case, but the system was manually scrambled by plant personnel.

## 'Nest' Rushed to Harrisburg

WASHINGTON, D.C. — Within a day after radiation began seeping from Harrisburg, Pa.'s Three Mile Island nuclear facility in what has been called the worst reactor accident to date, a Department of Energy (DOE) Nuclear Emergency Search Team (Nest) — which has relied on computer systems in handling previous mishaps of this sort — was rushed to the scene.

A Nest was reportedly first used in January 1978 when a nuclear-powered Soviet spacecraft crashed in northern Canada, spewing radioactive debris over more than 15,000 square miles of frozen wilderness. Within days of that crash, a squad of public and private sector radiation specialists began combing the

desolate tundra to detect and remove the debris.

Their efforts were supported by Data General Corp. Nova 840 minicomputers carried in vans.

Last week, a Nest of six to eight persons was flown to the General Public Utilities Co. site near Harrisburg to begin a study of why the accident there happened, a DOE spokesman confirmed. At press time, it was not clear what systems would be used in the analysis or in determining the extent to which the radiation spread.

DOE maintains a pool of specially trained experts on stand-by alert to be rushed as a Nest to any such accident, the spokesman explained.

The company and NRC officials presently are attempting to cool down the core of the reactor to safe levels. Even then, however, it may be unsafe

to enter the building because of high radiation levels. Radioactive water is thought to be covering the floor of the building containing the reactor.

## Transpac Makes Formal Bow

(Continued from Page 1)

telephone equipment presently in use.

Ministers participating in the dedication and the bus carrying members of the press arrived by a rear gate to avoid the demonstrators. On the way out, police had to push back the crowd to allow vehicles to pass.

The Transpac network actually began limited operation last December. Today it includes 10 switching nodes and six local control points to monitor network operations.

Speeches describing the benefits of Transpac service and the importance of the network to the French economy were presented by Norbert Segard, PTT minister in the French Government, and Yvon Lebars, president of the public Transpac company set up by the PTT to operate the network.

### Access Options

Transpac offers several user access options including a dedicated port, a general use dial-up port and direct access to the Telex network. Transmission speeds include asynchronous facilities up to 1,200 bit/sec and synchronous facilities from 2,400- to 9,600 bit/sec. High-speed lines at 19.2 K- and 48K bit/sec are also available.

The fees for using Transpac are based on the volume of data transmitted plus a dial-up charge based on the duration of the call or a flat monthly charge, depending on the type of facility used. Terminal-to-host connections can be made. Options include off-peak time discounts and closed user groups.

The Transpac net is the first major data network to become operational after the adoption of the CCITT X.25 packet standard. Access is available for non-X.25 terminals through translation boxes which adapt the terminal procedures to operate on the net.

IBM offers a capability to enable its Systems Network Architecture (SNA) terminals to interface directly with Transpac, but very few users are now operating in that mode, a network spokesman said.

Most of the users now on the network are engaged in interactive data base access, but other applications such as remote batch and electronic mail are expected to begin soon, the

spokesman said.

At present, Transpac service is available from most major French cities with additional nodes scheduled to be connected. Interconnection is planned later this year with the Telenet Communications Corp. and Tymnet Inc., packet-switched networks in the U.S.

An interface is also planned with the Euronet network scheduled to begin operations during 1979. Connections with other packet nets will use the CCITT X.75 standard, the spokesman said.

### Turnkey Operation

The Transpac net was built as a turnkey operation for the French PTT by the Societe d'Etudes des Systemes d'Automation (SESA). It uses primarily french-built Mitra 125 processors for call establishment, failure recovery and supervisory functions.

The switching units are CP50s from TRT. A dedicated communications bus interconnects the CP50s with the Mitra minicomputers. System monitoring and control is done at the network management center at Rennes.

The Rennes center is manned 24 hours a day to handle all system faults and other problems. The decision to locate the network management center there was described as part of an effort to decentralize Transpac operations. The selection of Rennes was "purely political," the network spokesman said.



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# Columbia's DP Center Seized in Labor Dispute

By Ann Dooley  
CW Staff

NEW YORK — Thirty-five demonstrators seized control of Columbia University's computer center and payroll facilities here two weeks ago in an attempt to call attention to an unresolved labor dispute between a group of university employees and the administration.

Members of Local 1199 of the Hospital and Health Care Workers Union, they occupied the computer center — as well as a university library — in apparent frustration over the collapse of contract negotiations between Columbia and the union. The employees have been working without a contract for

three months; their two-year contract expired Dec. 31.

The university computer center was chosen because union members believed it would be most affected by a work stoppage since critical, time-oriented work is performed there. A second reason was its location — below ground level with only one entrance — which makes it difficult to enter.

Blocking off the entrance, the demonstrators occupied the computer center on March 22, for several hours before New York City police, summoned by the university, broke down the door. Some demonstrators left of their own accord; others were carried out by police.

No work at the computer center was delayed because the occupation began

and ended during off-work hours.

All 35 demonstrators were arrested, but criminal charges were subsequently dropped by the university and all were released. The decision to drop the charges was made during labor negotiations, which were immediately resumed under the supervision of a federal mediator after the computer center occupation.

The 35 men and women will be placed on a month's suspension without pay, university officials said, but that decision will be arbitrated by a panel from the American Arbitration Association.

Although no decision has been announced on what action will be taken, Columbia officials contended that \$10,000 worth of damage occurred

during the sit-in by demonstrators who, the university claimed, overturned furniture and destroyed records. Local 1199 officials, on the other hand, said that only a minimal amount of damage was sustained and that it occurred when police forced their way into the premises wearing riot helmets, carrying batons and smashing glass doors.

The contract dispute primarily revolves around wages. The employees are asking for salary and pension increase of 7% a year over the course of the two-year contract.

Columbia is offering 6% raises the first year and 5% the second year.

To date, no decision has been reached on the contract, and the strike continues.

## Mass. Sued For Cross-Check

By Marguerite Zientara  
CW Staff

BOSTON — A class action suit filed last week against Massachusetts Gov. Edward King and other state officials claimed that the state welfare department is harassing and intimidating welfare recipients by means of illegal notices and illegal procedures following an erroneous computer cross-check of welfare and Social Security Administration data files to discover cases of fraud.

The suit, filed by the Massachusetts Law Reform Institute (MLRI) and Greater Boston Legal Services on behalf of 15,884 welfare recipients, claimed that the cross-check has deprived welfare clients of benefits to which they are entitled through clerical errors, old information and "computer lag."

Using income and welfare data that was 15 to 18 months old, the suit claimed, the welfare department ran part of the cross-check last September and the remainder in January and February. Following the cross-check, the 15,884 clients on whose behalf the suit was filed received notices saying that unless they could verify their income for the last two years, their public assistance would be terminated.

While computer cross-checks for fraud detection are not illegal, an MLRI spokesman explained, "the problem is they did a very erroneous computer cross-check and they sent out clearly illegal notices and adopted clearly illegal procedures that, in our opinion, were intentionally designed to scare and coerce welfare recipients into withdrawing from the welfare rolls, in order to reduce the cost of public assistance to the commonwealth."

The suit seeks no damages, but calls for an injunction to stop the state's allegedly illegal practices.

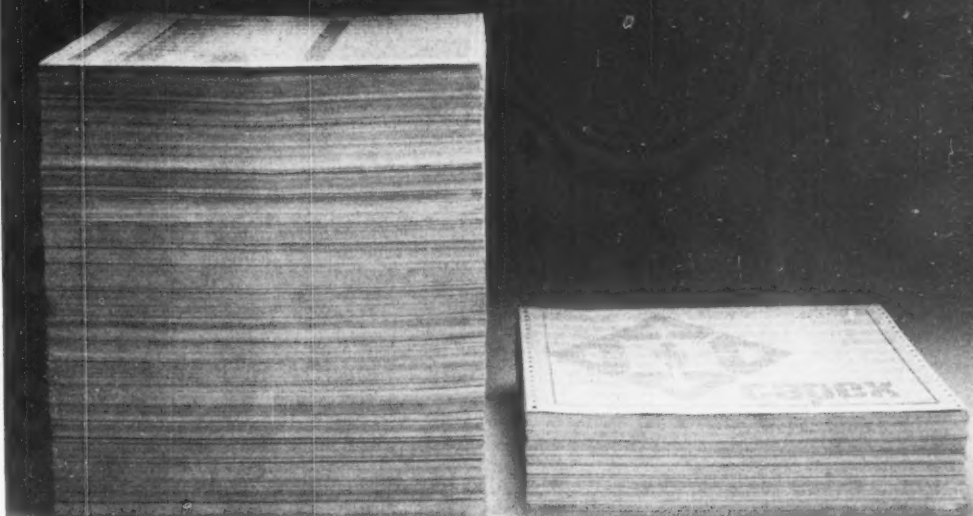
While some of the errors allegedly resulted from faulty clerical input, the spokeswoman noted, others resulted from "computer lag."

"The welfare computer is fed updated information a month after the relevant time," she said. "For example, if a client worked and received a reduction in welfare benefits in December, the reduction wouldn't show up on the computer until January, while the work would."

State officials were not available for comment at press time.

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# U.S. Evinces Disbelief in IBM Paper Claim

By Connie Winkler  
CW Staff

NEW YORK — If it took IBM only 43 days to provide documents on relief in 1971, when producing those documents was aimed at an out-of-court settlement, why would a similar request take IBM 2,000 man-years and bring the U.S. vs. IBM antitrust trial to a halt now?

That's the major point in the Justice Department's answer to IBM's angry attack on a government request for documents on the relief issue [CW, Feb. 26]. The government motion filed in January asked that a task force be set up to consider how to divest IBM in the event it is found to be a monop-

oly, and to that end the government requested a five-page list of post-January 1978 documents [CW, Jan. 29].

"Although there are some differences in the types of information sought from IBM in 1971 and that sought now, IBM produced documents in response to that request (when it served its purposes to do so) in 43 days — a far cry from the 2,000 man-years which IBM now states it will take to respond to a request not dissimilar in scope," the government's latest response stated.

"The government seeks only a relatively few, clearly identifiable documents — not the millions of pages

which IBM says it would be required to produce," it added.

The government agreed to reconsider the relief document request to alleviate what IBM considers "substantial difficulties" and said it would accede to stricter confidentiality requirements on the document production.

In addition, IBM does not need to provide the specific documents which present the information, but merely to list the facts — for example, products made by each plant. "That information of this type is not readily available to IBM in a central location is almost beyond belief," the government said in its memo. "It is noteworthy that IBM makes no assertion that it is not so available."

In its response presented to the court in February, IBM said this relief document request "would require the search of 350 million document pages located in more than 100 countries around the world, the ultimate produc-

tion after selection and privilege review of several million pages and an effort consuming more than 2,000 man-years."

Production of these documents — while IBM is in the middle of presenting its defense — would bring the case to a halt, and such a motion "brings starkly into question the good faith of the Department of Justice," according to lead IBM attorney Thomas D. Barr.

Ironically, the 1971 provision of relief documents to the Justice Department was noted by Barr in his related affidavit. According to Barr, IBM supplied the relief documents in late 1971 when it was prodding Justice to "either prosecute this suit or settle it."

In its response, the government also argued that proceeding with relief discovery now will "eliminate an otherwise inevitable delay of this case in the future" and that IBM rantings over the document production are a public relations effort.

## UK Government Topples

(Continued from Page 1)

ready shut down.

One of the centers primarily dealt with budget and financial projections, while the other handled automobile registrations. The latter was out of action for one day, angering motorists who needed to register their cars.

The unions scheduled meetings late last week to consider shutting down the nation's massive Health and Social Security System at Newcastle.

If the government does not come up with a better pay plan, the two unions indicated they will shut down that computer center completely, stopping the flow of social security checks to the public. Previously, this center was closed for just one 48-hour period.

### Next: A Conservative Government?

Several observers indicated that the inability of the Callaghan government to deal with the selective strikes, which have been crippling the government here, was one of the reasons for its loss in the House of Commons last week.

The betting late last week was that the government would be replaced by a Conservative government, which promised to take a harder line with the strikers. Elections will be held late this month.

If the Conservatives win, Margaret

Thatcher is expected to become prime minister, the first woman to hold that post in a European government.

## IBM Socks 4300 Users With Upkeep Fees

(Continued from Page 1)

Any maintenance that falls outside that base period can either be covered by the extra-cost contracts or be acquired on a time-and-materials, as-available basis. The current rate for field engineering services is \$76 an hour; available field engineers would apparently be sent first to contract customers.

### Complicated Schedule

The schedule for maintenance outside the "normal" or base period is complicated.

Every IBM machine carries a base maintenance price. For a 2M-byte 4341, for example, that price is \$475/mo. This is what purchase customers would pay for the base service which is received as part of the rental or lease rate.

The 4341, to continue the example, is classed in Machine Group D by IBM. If the user of a Machine Group D machine wants nine additional hours of service, any part of which is outside

the hours of 7 a.m. to 6 p.m., he will be charged 10% of the base price. If the user wants 12 consecutive hours of service, the charge will be 12% of the base price; 16 hours will cost 14%; 20 consecutive hours will cost 16%; and 24-hour-a-day service will cost 18% of the base price.

However, that is only for service Monday through Friday. If the user wants the same hours of coverage on Saturday, the rates are 4%, 5%, 7%, 8% and 9%, respectively. And if Sunday service is desired, then the rates are 5%, 7%, 9%, 11% and 12%.

Therefore, the user who wants the traditional 24-hour-a-day, seven-day-a-week service will have to pay 39% (18% plus 9% plus 12%) of the base price in additional monthly charges, or \$185.25 per month for maintenance. Over a 35-month period, that would total \$6,483.75.

### Criterion of Assignment

Machines are apparently assigned to certain machine groups on the basis of the difficulty of maintenance.

Devices classed as Machine Group D, like the 4300 processors, carry a 39% surcharge over the base price for full-time maintenance service, as the above example demonstrates.

However, these devices appear to be the easiest to maintain, since the charge for equipment in Machine Group A for similar maintenance coverage would be 47% of the base charge, while devices in Machine Group B carry a 59% surcharge over the base and machines in Machine Group C carry a whopping 79% of the base price surcharge.

In the example of a 4341, if that system had four spindles of 3370 disk attached, the price would go up. The 3370 is a Machine Group D unit and the base price for the Model A1 is \$120/mo. The B1s carry a charge of \$90/mo.

Therefore, the charge for a four-spindle system (one A1 and three B1s) would be \$390/mo for base service. This means the units would cost \$152.10 for full-time maintenance service.

If a 3880 storage control unit is added, the price goes up further. The

### MONDAY — FRIDAY (Until 8 a.m. Saturday)

Machine Group	Consecutive Hours—				
	9*	12	16	20	24
A	10%	14%	18%	22%	26%
B	10%	16%	22%	28%	34%
C	10%	19%	28%	37%	46%
D	10%	12%	14%	16%	18%

\* 9 hours any part of which is outside the hours of 7 a.m. to 6 p.m.

### SATURDAY (Until 8 a.m. Sunday)

Machine Group	Consecutive Hours—				
	9	12	16	20	24
A	4%	5%	7%	8%	9%
B	5%	6%	8%	10%	11%
C	8%	9%	11%	13%	15%
D	4%	5%	7%	8%	9%

### SUNDAY (Until 8 a.m. Monday)

Machine Group	Consecutive Hours—				
	9	12	16	20	24
A	5%	7%	9%	11%	12%
B	6%	8%	10%	12%	14%
C	9%	11%	14%	16%	18%
D	5%	7%	9%	11%	12%

3880 is a Machine Group B device and carries a base charge of \$160/mo. Since 24-hour, seven-day service on such devices costs 59% of the base charge, the 3880 monthly maintenance would run \$94.40.

Finally, if a 3203 Model 5 printer were added to this configuration, the base maintenance price would be \$340/mo. This is also a Machine Group B device, so full service would cost \$200.60/mo.

The total additional cost for this system, then, would be \$632.35/mo for the user who needs around-the-clock service. Over a typical 35-month life for the system, the additional maintenance would cost \$22,132.25.

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# At Transamerica Antitrust Trial Testimony Says IBM Sold Tape Units at Loss

By Jeffrey Beeler

CW West Coast Bureau

SAN FRANCISCO — IBM apparently marketed several of its tape system models at substantial losses during the early 1970s when competition from plug-compatible manufacturers (PCM) was mounting steadily.

That picture of the industry giant's activities emerged last week as certified public accountant Alan Peterson continued his testimony at the Transamerica Computer Co. vs. IBM antitrust trial.

In financial studies designed to assess the market impact of its upcoming products, IBM predicted healthy profit margins for its 2401, 2319B and 3420 series tape units, according to Peterson, a partner in the Chicago-based accounting firm of Arthur Andersen and Co. But when the accountant independently examined IBM's financial claims according to "generally accepted" cost accounting principles, he concluded that the three models produced more overhead than revenue.

Peterson's conclusion appears to confirm earlier testimony that IBM sometimes went to extraordinary lengths to protect its market dominance when it felt threatened by competition from PCMs.

## Impact of 3420

Under direct examination by Transamerica lead attorney Richard Lucas, the Arthur Andersen partner produced a nine-year-old IBM document showing that the 3420 series would cut revenues from IBM's existing tape systems line by \$403 million.

But that same document also predicted a \$473.3 million profit from the 3420 itself, Peterson testified. Thus,

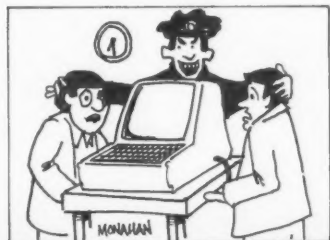
## Updated Booklet Out for Students

PARK RIDGE, Ill. — A booklet that serves as an introduction to the field of information processing for primary and secondary school students has been updated by the Data Processing Management Association (DPMA).

The eight-page "ABCs of DP" replaces the "ABCs of ADP."

Programs and programming languages are explained in the 5.5-by-8.5-in. publication, which also outlines the duties of computer personnel.

A list of periodicals, associations, major manufacturers and government agencies is at the end of the booklet, which is available at 20 cents per copy (the minimum order is 100 copies) from DPMA International, 505 Busse Highway, Park Ridge, Ill. 60068.



'So! The Famous Moriarty Bros., Taking Their Work Home With Them, Hmm?'

IBM concluded that the 3420 (nicknamed "Aspen") would negate any losses among the firm's other tape systems and yield a net revenue gain of \$70.3 million.

However, a much less favorable picture of Aspen's expected market impact emerged when IBM's financial conclusion were subjected to independent scrutiny. After the firm's market figures were adjusted for revenue apportionment and manufacturing costs, the 3420's prospects as a money-making product diminished by a "very substantial amount," Peterson said.

In fact, he added, IBM found itself in "worse condition" after Aspen's introduction than before.

A similar fate befell the company following its announcement of the 2401 and 2319B tape systems. Although IBM predicted financial success for both products, Peterson found that, when he made appropriate adjustments for revenue apportionment and manufacturing costs, the 2401 and 2319B resulted in a \$14.4 million and \$12.2 million profit loss, respectively.

In both cases, the witness attributed the lost earnings to the products' harmful impact on existing tape system sales.

Peterson's calculations of IBM's diminished income underscored his testimony from the previous week, when he disputed IBM's forecast that

the 2319A3 tape system (code-named "Zoom") would result in a 4.5% profit margin. Instead, he testified, standard financial analysis showed the product reduced IBM's tape systems profits by an estimated 19.6%.

Using the same accounting methods, he also estimated IBM's losses from the 2401A tape unit at 13.9%.

In other testimony, Peterson produced statistics that purportedly showed IBM consistently underestimated its tape systems' predicted rental life. For the Zoom tape unit, for example, IBM listed a 16-month product life, compared with accepted accounting procedures that estimated life expectancy to be 36 months.

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# Housing System Helps Low-Income Mexicans

By Nancy French

CW Staff

MEXICO CITY — Housing the world over is a very expensive commodity. In a country like Mexico, where approximately 60% of the heads of households earn less than \$150 per month, financing the purchase of a decent home is even more difficult.

Since 1972, a nonprofit organization here, funded by business and administered by government, has been working on this problem. To date, it has managed to build 150,000 apartment-type units of various sizes for low income families, and approximately 50,000 more units should be ready for occupancy by year's end, according to an information systems chief who asked that his name not be used.

Instituto Del Fondo Nacional para la Vivienda de los Trabajadores (Infonavit) functions like a bank to provide low-cost mortgages for workers who qualify.

The interest rate is a scant 4% per year, compared with the 11% to 14% provided by some banks for "social" purposes and the usual going rate of 22%, he explained.

## Other Loans

In addition to building new units and housing workers' families in them, Infonavit makes some loans for building single family homes, enlarging and refurbishing existing ho-

mes, buying houses for workers and refinancing homes already purchased under regular commercial mortgages, although loans for

where the cost of living is higher, earn somewhat more. The typical approved borrower earns two to three times that amount.

## International News

these purposes are not made as often, he said.

Infonavit uses a soon-to-be-upgraded Burroughs Corp. B-6700 dual processor with 512K bytes of memory, 28 disk drives and a variety of tape, card and printing units for processing everything from applicant eligibility and basic administrative chores to financial control of buildings in progress.

The projects are financed out of a fund built with contributions from approximately 30,000 companies — large and small — that participate in the scheme. Each company contributes 5% of the earnings of every low-income worker on its payroll.

The fund stands at about \$2.3 billion today, the spokesman said.

Nearly four million low-income workers — chiefly men with nonworking wives and large families — are registered and eligible for low-interest mortgage loans, the spokesman said. The minimum wage in Mexico is approximately \$52 per month, although people living in Mexico City,

Various records must be kept on each eligible worker as well as on the companies that contribute the funds and withhold the mortgage payments from employees' paychecks.

## Needy Families First

Since there will never be enough housing to go around, Infonavit makes an effort to help the most needy families first, the spokesman explained. The criteria determining need are evaluated by computer in accordance with a point system.

Factors considered include salary, number of children and condition of current housing.

When a worker is selected for housing, he may borrow enough money from Infonavit to purchase a unit of the appropriate size. To make sure he repays the mortgage in the 10 or 20 years allotted, his employer withholds his mortgage payments — which amount to either 14% or 18% of his monthly earnings — and forwards them to Infonavit via the Secretaria de Hacienda y Credito Publica — the Mexican treasury department.

Although this may seem like a round-about method for doing business, under Mexican law only the Hacienda may collect money, so that's the way its done, the spokesman explained.

## File-Oriented System

Source documents from Hacienda are entered via a Univac Cado key-to-tape system that supports about 24 CRT terminals.

The system is basically file-oriented, and processing is principally batch. Some data — such as the worker's name and address "credits" file — is maintained on-line for access by caseworkers in 18 field offices.

These caseworkers interact directly with eligible workers and collect information on such changes as the birth of a child, for example. Although they can access master records from the field via CRT terminals, all changes must be input from the central facility, the spokesman explained.

Other files, such as the employer mortgage payment files, are maintained on tape. The mortgage payment files are updated only every other month.

When the B6700 is upgraded in April, it will get a second 512K-byte memory unit, double-density disks and fas-

ter tape and printing units. The spokesman pointed out, however, that this upgrade should not be interpreted as a vote by Infonavit management for centralized processing. In fact, Infonavit's long-term plans call for a distributed system with private lines to tie them to the B6700 at headquarters.

The first step in the evolution of a distributed system is installation of a B1700 in Guadalajara, the fastest growing regional office.

## Repayment Policies

At the end of 10 years, each worker who hasn't gotten a home is automatically repaid 100% of the contribution made by the employer during the first year. In addition, if the worker changes jobs, his new employer picks up payment of the 5% contribution.

If the new employer does not participate in the fund, the worker's accumulated credits are also refunded in a one-time cash payment.

Housing units range in price from \$10,000 to \$14,000, and the minimum mortgage loan depends on how much a worker can realistically be expected to repay in either 10 or 20 years.

Mortgages are insured and therefore forgiven if the head of the household dies.

## Mexican DP Association Resembles Fraternity

By a CW Staff Writer  
MEXICO CITY — With only about 2,000 programmers and analysts and about 5,000 DP support personnel operating all the computer systems in Mexico, computing is still a very small profession here, according to estimates provided by the Academia de Mexicana de Informatica Association Civil (Amiac).

Amiac is the only professional computing society in Mexico at present, members said. However, it is more like a club or fraternity than are the professional societies found in the U.S.

According to Amiac member Mario Fosado Penaloza, professional work performed as an occupation, articles published and academic degrees earned are important for membership. Amiac is a closed association with life membership.

Membership in the society currently stands at 46 and will not be expanded beyond about 50 or 60. However, a new category of membership — associate member — is being established, and an unlimited number will be admitted, Penaloza said. However, he did not explain the difference

in privileges.

The organization was formed about three years ago to provide "informaticians" with a place "to discuss scientifically the development of informatics and to study the impact of information on the social, economic and political environment," Fosado Penaloza continued.

Among the activities in which the charter members participate are conventions such as the recent first International Convention of Informatics and a monthly magazine called *Informatica*.

Members come from the vendor and user communities as well as academia.



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# With Pressing Need for Energy Mexico's Oil Company Planning Major Upgrade

By Nancy French  
CW Staff

MEXICO CITY — Mexico's sharply increasing energy needs and those of her North American neighbors are pressing Petroleos Mexicanos (Pemex) to adopt the management style and equipment used by the world's other major oil companies.

And this includes computers, according to Carlos Uriegas Torres, manager of informatics for Mexico's nationalized oil company. Computers will be used to "increase productivity" rather than merely continue to run the largely administrative applications that make up the bulk of today's workload, Uriegas Torres said in a recent interview here.

Present plans call for significant upgrades of hardware as well as the implementation of new software over the next five years. Pemex's goal is a fully developed, companywide network with "integrated applications that are transferable from one side to another," Uriegas Torres said.

Although people usually think five years ahead, in Mexico nobody talks too much about events beyond December 1982, when President Lopez Portillo's six-year term comes to an end.

With a new administration all national goals could change, Uriegas Torres explained.

## Current System Saturated

The Pemex central computer facility is equipped with a Control Data Corp. 6400 mainframe and related peripherals. That system is currently saturated with largely batch-oriented administrative applications.

Applications that support functions other than administrative ones — such as exploration and production — are performed largely out of house on a contract basis.

Pemex's applications currently break down into six general categories. Besides administration, they include exploration, production, refining, transportation/distribution, basic petrochemical and sales.

A year or two ago, only administra-

tive applications such as payroll and budget were automated. Other isolated applications were developed in response to user requests.

Some, such as the exploration department's exploration work, were farmed out to firms such as Slumberger and Western Geophysics. These service contracts are managed directly by the exploration department, rather than informatics, Uriegas Torres said.

When only computer time is needed, it has been available on the Mexican Instituto de Petroleo's IBM 370/148, enhanced with a 3038 array processor.

## Upgrade Plan

The upgrade plan calls for retaining the CDC system for existing programs and developing all new on-line applications on the new system. Existing applications would be migrated gradually to the new system, but that would all take some time, Uriegas Torres said.

Pemex officials are seeking to install a machine in the IBM 3033-size class. The company is presently evaluating bids from five vendors for the initial hardware upgrade.

The five vendors that responded to the functional specifications set out in

the oil company's request for procurement include IBM, CDC, Burroughs Corp., Univac and International Computers Ltd., a British firm.

As for data, Uriegas Torres plans to

## International News

develop a centralized data base for information needed in headquarters and a distributed data base for information needed in the field. In this effort, Pemex would be emulating work already going on in large oil companies he has visited in the U.S.

## Simulation Expansion

Along with the hardware upgrade will come expansion of Pemex's use of computer simulation, Uriegas Torres said. At present, small-scale simulations written in-house are being run, but he expects to purchase simulation packages of the type offered by Intercomp and University Computing Corp., he said.

These packages need big systems

and, at this time, "We don't have the computing power needed to run them," he explained.

With these systems, the production department will have more effective control of its reservoirs, he said. Decisions on where to extract oil, at what rate, what effect water injection will have and where to inject it, for example, will be backed up by computer data.

Pemex's oil production will grow predominantly in the Southern Zone, where the newest resources have been discovered, he explained.

In this area, Pemex will soon begin operating its first computer-controlled plant to process ethylene (from which natural gas is made). Three times larger than any existing ethylene refinery, the plant's production will be controlled by a Foxboro Co. minicomputer.

Refineries operate 24 hours a day, seven days a week, and the Foxboro system will be used to monitor all sensors, instruments, flows, temperatures and pressures to keep the refinery operating at top efficiency, Uriegas Torres indicated.

## Do You Wear Glasses?

Here's an effective new eye-exercise program that can produce astonishing results in a very short time . . .

by  
Dr. James Kennedy

The Bettervision Eye Clinic is now offering a program of eye-exercises that can completely cure most cases of poor eyesight — so that glasses or contact lenses are no longer needed. Originally developed by Dr. William H. Bates of the New York Eye Hospital, this method has been widely used by the Armed Forces, schools, clinics, and thousands of private individuals.

- nearsight
- farsight
- astigmatism
- middle-age sight

For many years it was thought that poor eyesight was just bad luck, or something you inherit from your parents. Scientists now know that most eyesight problems are caused by accumulated stress and strain — which squeeze the eyeball out of shape, and affect the muscles that do the focusing. The result is the eye cannot form a clear image, and the world appears to be blurry.

The Bates Method corrects poor eyesight by strengthening these muscles and relaxing the eyeball. You do simple easy exercises that increase your focusing power, eliminate eyestrain, and make your eyes strong and healthy.

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If your eyesight is not too bad, you can expect to return to 20/20 vision in about a month. Even if your eyesight is really poor, within 2 to 3 months you should be able to put away your glasses, once and for all. Read these case histories:

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**Rev. Frederick A. Milos, M.S.**  
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**Karen Grant—Journalist**  
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# Mexico on Brink of Severe DP Staff Shortage

By Nancy French

CW Staff

MEXICO CITY — By this time next year, the number of personnel needed to staff this country's DP installations is expected to zoom from 7,000 to 20,000 to keep up with the rapid expansion of data processing here.

But where will they come from? DP managers were frankly scratching their heads over this severe shortage of experienced personnel at the First Convencio Internacional de Informatica held here recently.

Not surprisingly, the problems found throughout the educational system in

Mexico are reflected in DP training. For every five million children who enter the first grade in this country, only two million are still in school by the end of grade nine, according to one ed-

## International News

ucator here.

Of that number, only one million graduate from the Mexican equivalent of the U.S. 12th grade, and perhaps

250,000 enter college in all disciplines. Industry here is therefore hard-pressed to fill its growing number of DP openings with individuals trained in DP, computer science or mathematics.

Most trainees are engineering graduates from Mexican universities or the equivalent of a high school graduate with a mathematics aptitude, according to DP managers interviewed here.

The majority of DPers here — from operators to programmers to analysts — are trained by vendors and by the user organizations that hire them. What's more, it takes one of these new employees several years to become productive, several DP managers said.

### Unique Institution

Aside from the vendor programs, today only a handful of schools provide any formal training in data processing — the Universidad Autonoma de Mexico, the Universidad Anahuac, the Tecnologico de Monterrey and the Universidad La Salle. These schools are heavily engineering-oriented, according to Moises Sorkin Alvarez, who heads the informatics career program at the Instituto Politecnico Nacional in Mexico City.

Instituto Politecnico Nacional is unique in the educational picture here because it is the only school to offer a program that provides "an interdisciplinary approach to informatics," Sorkin Alvarez said. Rather than preparing students in computer science on the one hand or merely data processing on the other, the Unidad Profesional Interdisciplinaria de Ingenieria y Cien-

cias Sociales y Administrativas offers a program of courses that includes computer science, operations research, mathematics, administration, theory of decision making, engineering of systems (software) economics and accounting.

The program takes about four years and earns students baccalaureate degrees. Two-year associate degrees are also available.

But this program is capable of producing only about 60 graduates per year, Sorkin Alvarez said.

In addition, the Mexican lifestyle and culture, which include early marriage and large families, works against the educational process, and many students fall by the wayside, he said.

Many students are working to support families at the same time they attend school. The cost of tuition — which can range anywhere from \$20 per year at a government school to \$175 per month at a private university — and the number of study hours involved are a heavy burden.

With the personnel shortage that exists in DP today, a student who has taken a few courses and who has had a little practical DP experience can earn \$800 or more a month in a full-time DP job. There is little incentive, therefore, to stick around for a degree, Sorkin Alvarez pointed out.

The program produced its first generation of graduates in 1967 and started its B.S. degree in informatics in 1967; ironically, however, the program was canceled by the government in 1969.

The programs were restarted about 1975, but today only about 200 individuals in Mexico hold degrees in informatics.

Fifty or 60 people in the Mexican DP workforce earned similar degrees in other countries.

The government is aware of the shortage and, with advice from academia and industry, it is working to develop a national informatics training plan, Sorkin Alvarez said.

## 'Informatics' Helps Grasp 'Life's Circumstances'

By a CW Staff Writer

MEXICO CITY — What is "informatics"?

The term was first coined in France in 1964 and formally approved by the French Academy of Languages in 1966. It was used to express the concept of automated information, and people began to relate the word to the use of computers, according to Dr. Viriato Gomez de Oliveira, assessor in the Subsecretaria de Educacion e Investigacion Tecnologicas of Mexico's Secretaria de Educacion Publica.

Mexican "informaticians" have developed the term still further, according to Gomez de Oliveira, who defined informatics as "the science of the intelligent systems of information."

"Informatics is a means of conceptualizing and filtering information that enables man to understand life's circumstances," he explained. The computer is only a tool for use in making data into information.

The term is used throughout the world except in the U.S., where the terms "computer science" or "computing" and sometimes the more mundane "data processing" are preferred.

The name Informatics has been trademarked by Informatics, Inc., of Canoga Park, Calif., which has asked that it not be used generically.

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## Lehigh Adds Computing B.S.

BETHLEHEM, Pa. — In an effort to expand its teaching and research activities, Lehigh University has added an undergraduate program to the Department of Mathematics' curriculum that leads to a bachelor of science degree in computing and information science.

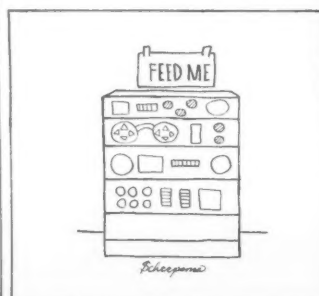
The program meets the Association for Computing Machinery's minimum curriculum requirements and combines the technological, scientific and business aspects of the computer industry with linguistics and communications, a university spokesman said.

### Degree Requirements

Students in the program must complete 39 credit hours of introductory courses followed by 81 credit hours in either computer or information science.

Lehigh previously offered graduate degree programs in computing and information science through the Center

for Information and Computer Science, an interdisciplinary master of science program in computer science and an undergraduate degree in information science through the Department of Philosophy.



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# James Martin Advises: 'Top Brass' Need Briefing on Technical Change

By Ronald A. Frank

CW Staff

NEW YORK — DP and telecommunications managers must enlist the help of top management if their companies are going to keep pace with technological changes, James Martin, well-known author and lecturer, said in a recent interview here.

Advances in such areas as microtechnology and network offerings make it imperative to brief top management on technical changes and how they will affect corporate strategy in the next five years, Martin warned. This means DP and telecommunications managers must develop ways to present management with available options, indicating which choices are best for management strategy.

The critical areas for developing five-year plans are networks, files and data bases and distributed data processing. When corporate strategy is developed, the plan invariably becomes a "counter-political" document, Martin said.

If top management can be convinced that corporate politics should be secondary to the development of a corporate strategy, then DP and telecommunications managers will have done their jobs correctly, he added.

Realizing that an approach to top management will not come easy to DP or telecommunications managers, Martin stressed that precisely because management has the power to minimize political roadblocks, its aid should be enlisted. Many DP managers do not normally interact with telecommunications managers; this in itself may be an innovative step in many companies, he said.

## Get Management to Listen

A corporation can begin to consider integrating a previously separate function or upgrading existing facilities only when those immediately involved have cooperated in working out the details. "When you tie company mail together with DP, you are slicing up somebody's empire," Martin pointed out.

It is important to get top management

to sit still and convince it that changes in technology will have a profound effect on corporate operations, Martin said. In some cases, the managers who make the approach will have to seek assistance from outside consultants on the best ways to get the attention of top management.

The explanations must be broad but, at the same time, the top decision makers must be given enough details to impress on management the importance of developing a five-year plan, Martin advised.

Only a handful of companies already have a corporate plan for network strategy, yet this is one of the most critical areas. If networks are allowed to proliferate within the company on an individual basis, costs will be excessive and incompatibilities will develop that will be difficult to overcome, he warned.

## Basic Guidelines

To develop a comprehensive recommendation for top management to consider, DP and telecommunications managers will have to estimate what equipment costs will be in three years, what will happen to line charges, how data base management will change and how the changes will affect the way their companies do business.

A methodology for developing such an analysis for presentation to management is what attendees at his worldwide lectures ask for repeatedly, Martin said. While no standard approach will work in all companies, basic guidelines can be established to attack the problem, he said.

Some DP managers who approach their management are rebuffed. Setbacks may occur until decision makers are convinced, but when management understands the importance to the corporation, then "events begin to happen," he said.

Changes are taking place at a rapid rate. Even when a corporate plan is agreed upon, it will be subject to continuous reevaluation and modification. However, when a company decides on an integrated network solution, benefits not previously achievable will result, Martin predicted.

When voice and data run on an integrated net, the cost of the data often drops, even though it probably averages less than 10% of the voice volume, he added.

## Factors to Consider

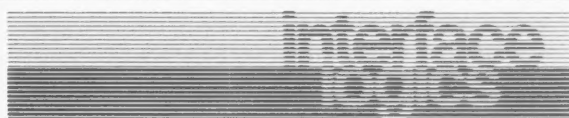
Key elements to developing a corporate plan include looking at where a firm is today and where it should be in five years, then listing the steps necessary to get from here to there. Many of the solutions will create considerable upheavals — for example, taking out terminals that can't operate on new

networks or dispersing central DP resources to remote locations.

Whenever doubt exists about the best solution, a detailed model can be developed and a strategy can be put into action based on the best modeling results, he explained.

DP and telecommunications man-

agers cannot afford to ignore the many options that will confront their companies in the next few years. If they don't take the initiative to convince top management of the necessary changes today, others within the corporate hierarchy will seize the initiative, Martin warned.



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# Local Talent Giving Mass. School's Mini a Boost

By Jay Woodruff  
CW Staff

HOLLISTON, Mass. — If a high school in your town bought a minicomputer for student use, would the school find enough DP talent to get the most out of the system?

In the case of Holliston High School here, nearly all the enthusiastic parents and other volunteers who attended the first organizational meetings have extensive experience with computers, some as much as 20 years.

That fact might seem surprising until one realizes the school is located about 25 miles west of Boston, close to

the many hardware and software firms in the area.

The computer they will help the school to use is a Prime Computer, Inc. P300 with 192K bytes of memory and 6M bytes of disk storage. Included in the \$20,000 purchase price are seven on-line CRT terminals and a 200 char./sec printer.

This system replaces a floppy disk-based 12K-byte Wang Laboratories, Inc. computer that will see further duty at the Holliston Middle School. The Prime system was delivered last month.

To drum up interest in the project, the school sent out a

letter informing parents and computer professionals in the area that it had acquired the CPU and wanted some help making it a useful tool for students. The first meeting drew 32 people and in subsequent meetings, the numbers have steadily increased.

## Call for Volunteers

The call for volunteers to contribute their expertise was largely the work of Joe Phillips of Phillips Associates. A town resident, he is also an international lecturer on computer systems and has been elected to *Who's Who in America*.

"Some volunteers said they had always wanted to contribute something to the community, but they hadn't before this because they didn't want to go into politics," he said. Young and single people showed up as well as parents, and Phillips expects their numbers to increase.

"I'm sure the school is going to learn a lot from these people and they from each other," he predicted.

The committee, which meets after supper on a weeknight, drains a large coffeepot as it determines where it wants to take the system and the school's computer program. A meeting can last until 10 p.m. some nights.

The group's eagerness to contribute suggestions often results in almost too many to consider. Among the possibilities they have brought up are adult courses, school administration programs, instructional development and field trips to local manufacturers and users.

For now, the school plans to schedule 40 class periods with the computer each week and will be able to accommodate as many as 49 classes a week, according to the school's principal, Jim Kamatian. The facility is used mostly by 50 seniors with high grades, but Kamatian would like to see it opened to as many students as are interested.

## Help From Programmers

Volunteers plan to help in a number of ways. Minnette Koffinke, a program analyst with 20 years' experience — 15 of them with her current employer, Zayre Corp., a large department store chain based in this area — would like to help program the Wang system for the middle school.

Kaffinke, like many of the volunteers, received a letter from the school asking for assistance. "I had the needed experience and interest in computers," she said.

One parent with two children and his own programming business wants to help put together part of the school administration program, as

well as develop methods and procedures for system use. "I want to use my experience elsewhere, besides writing programs all the time," he explained.

## Making Comparisons

Lydia Losch, a systems program analyst at Bose Corp. in nearby Framingham, was impressed with the school's acquisition. "With the Wang, one kid could have only 12K bytes with which to play. Now each can have 64K bytes. It's very powerful, and it will be a fantastic opportunity not just for the school, but also for the town," she said.

Tony Polise was also impressed with the system and wants to see that as many children as possible have access to it. "I want to do whatever I can to get kids interested in the computer," he noted.

He plans to help teachers with engineering applications programs. He likened the move from the Wang computer to the new system to a switch from an abacus to a

calculator. Polise is manager of software engineering at the Raytheon Data Systems Co. in nearby Wayland.

Another person volunteering her time is Linda Belanger, the Prime marketing representative who sold the system to the school. She has been present at the organizational meetings, answering questions and offering suggestions on how the school can take advantage of the mini.

The P300 was considered a good choice by the group because it is upgradable and can be expanded to include as many as 32 users.

Since most of the volunteers attending organizational meetings have a business background, many of their suggestions revolved around the business applications the computer could run. Spirited discussion ideas included doing DP work for the town of Holliston and making enough money from running applications for outside organizations to buy more equipment and software for the students.

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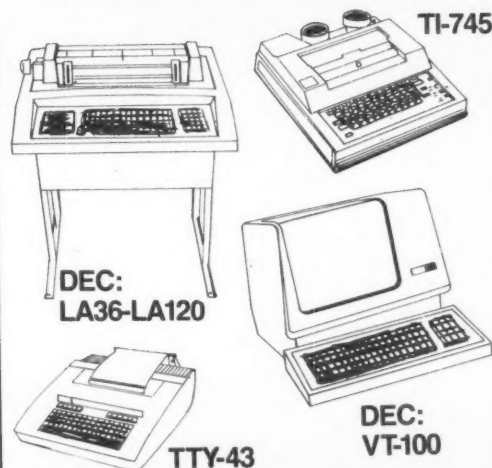
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## In Wake of Near-Collisions

# N.Y. Airports Getting Altitude System Sooner

By Marguerite Zientara  
CW Staff

NEW YORK — In response to a number of recently reported near-collisions in New York air space, the Federal Aviation Administration (FAA) has decided to speed implementation of a computerized system designed to furnish airplane altitude data to the area's three main airport control towers.

The recent announcement by FAA Chairman Langhorne M. Bond was the result of a review into the adequacy of altitude reporting in all busy U.S. air terminals. The review was undertaken in December in the wake of last fall's San Diego midair collision.

Only recently has it become widely known that New York's three main airports — La Guardia, Kennedy International and Newark International — lack altitude information on the airplanes in their vicinities. The reason for this can be traced to Kennedy's Common Instrument Flight Rules (IFR) Room, which directs planes from their departures from the three airports to an altitude of about 17,000 feet within a 50-mile radius and then hands them off to Air Route Traffic Control Centers (ARTCC).

### Haste Makes Waste

Because of New York's congested air space, it was one of the first to obtain a highly computerized traffic control facility — the Common IFR Room. But

what the facility gained in early acquisition, it sacrificed in sophistication.

The Common IFR Room is equipped with the Arts I-A air traffic control system, which cannot remotely transmit altitude information to the airport towers. To gain that ability would require "major alterations" to the present system, according to an FAA spokesman.

Unlike New York's facility, later control systems implemented at such places as Los Angeles and Chicago can show the altitudes of planes up to 50 miles away as well as feed altitude data to towers handling closer traffic, FAA officials explained.

### Start-Up Date Delayed

The altitude data system for New York, now slated for operation by Oct. 1, is part of the long-planned Terminal Radar Approach Control (Traccon) facility at Garden City, Long Island, which was originally scheduled for full operation by October 1979.

Although the building itself is complete and the hardware has been installed, the slow development of operational software has delayed the Traccon opening date another year, to about October 1980, the officials said.

In order to gain the altitude data transmission capability as soon as possible in New York, Traccon's sophisticated Arts III traffic control system will be put on-line early, before the building is commissioned.

By next fall, New York's three main airports are expected to have altitude readouts on all aircraft equipped with the proper transponders, one FAA spokesman said.

While New York has been planning the Garden City facility for six years as a replacement for the Common IFR Room, recent events have indicated the need for faster development of the altitude data system, even though the entire facility will still open at least a year after its original target date.

Seven near-collision reports have been filed in the New York area so far this year, as well as six "system errors," according to an FAA spokesman in the

New York regional office. A "system error" is a mistake that brings airplanes illegally close to one another.

The figures compare with 17 near-collisions and 16 system errors in 1978.

The Traccon center will handle landings, departures and through-flights for the three main airports, as well as for up to 30 subsidiary airports. Housing eight Univac I/O processors and a total of 15 memory modules, each with 16,000 words, the facility will have redundant capabilities to allow reconfiguration in the event of a system failure. Altitude data will be transmitted to control towers over phone lines.

## Conference on DP Auditing Opens Today in Chicago

ALTAMONTE SPRINGS, Fla. — The Institute of Internal Auditors, Inc.'s (IIA) Ninth Conference on Computer Audit, Control and Security is starting in Chicago today.

The IIA expects the four-day conference, co-sponsored by the Automation Training Center, Inc. of Reston, Va., to be the largest program ever presented in the field of computer audit, control and security. Among the featured speakers will be Charles Lecht, James Martin, Bernard Plagman and Robert Head.

Topics to be covered include disaster recovery planning, the auditing of minicomputer- and microcomputer-based systems, control of the systems programming activity and software reliability and auditing.

Registration for the conference, which will be held at the Radisson Chicago Hotel (reported to be sold out at press time), is \$495 per person, including meals, receptions and conference materials. Additional information is available from IIA at 249 Maitland Ave., Altamonte Springs, Fla. 32701.

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# Study Lists Reasons for Paucity of Convictions

By Marguerite Zientara  
CW Staff

WASHINGTON, D.C. — By analyzing computerized law enforcement and judicial data gleaned from the District of Columbia in 1974, the Institute for Law and Social Research (Inslaw) has pinpointed several reasons why arrests for serious crimes often fail to result in convictions.

The main conclusion drawn by the institute is that while there are many points in the judicial system at which a case may be dropped, the prosecution usually decides not to proceed with a case because of

insufficient testimony or tangible evidence.

## TV Defense a Myth

"The failure of arrests to end in conviction is rarely the product of skillful courtroom histrionics by a brilliant defense counsel, as has been popularly portrayed on television and in the theater," according to Brian E. Forst, Inslaw's director of research and the principal author of *What Happens After Arrest?* an Inslaw publication on which the conclusions are based.

Relying largely on data from

the Inslaw-developed Prosecutor's Management Information System (Promis), implemented in the District of Columbia in 1971, Forst and his colleagues identified the problems, proposed some solutions and cited areas for further research.

## Keeping a 'Promis'

Promis includes more than 170 items of information for every case entered into the system. The information, falling into four categories, includes details about the criminal incident as well as details about the defendant or the accused.

Also included is information regarding the progress of the case from arrest to disposition and sentencing and data on the participants — victims and witnesses, police officers and special experts, prosecutors and defense attorneys.

Besides the Promis data, Inslaw used information from the Personnel files of the District of Columbia Metropolitan Police Department concerning officers' age, sex, length of service, marital status, place of residence, assignment and rank.

Writing of the study's results in the *Wall Street Journal* Feb. 16, Forst noted that in Washington, D.C., for example, the prosecutor drops "about half" of all arrests, most often because of insufficient evidence or poor witness support.

While the data examined did not point specifically to the large caseloads of metropolitan district attorneys, Forst wrote, "many cases that might be adjudicated in a smaller jurisdiction cannot receive much attention in an office that processes a thousand or more felony arrests each month."

## Lack of Skill

Another factor cited by the institute's study is the skill — or its lack — displayed by arresting officers in obtaining supportive witnesses, recovering evidence useful to the prosecutor and generally making arrests with an eye toward conviction.

"Over half of all convictions that followed the felony arrests ... are attributable to a small corps of 249 of the 2,418 officers who made arrests," the study found. On the other hand, 747 of the officers who made arrests — 31% of all arresting officers — never made a single arrest that ended in conviction.

Addressing that point, the institute recommended that incentives be given to officers for making arrests that end in convictions since officers "are presently typically not evaluated on the basis of what happens after arrest."

In addition, Inslaw pointed out, "supercops" who consis-

tently make arrests resulting in convictions are usually promoted to administrative positions that take them off the streets.

Besides keeping these "supercops" on the streets, police departments would do well to incorporate the procedures used by the "supercops" into both preservice and in-service training programs, the study recommended.

## Arrests Dropped

Further analysis of the computer data indicated that many of the arrests dropped by the prosecutor because of inadequate witness support involved defendants who assaulted a spouse or other family member, a lover or a friend. While Forst noted that police arrests are often necessary to stop crimes of passion that could end fatally, "there may be little value in prosecuting most of these cases."

"There is no convincing evidence that such prosecutions deter this kind of crime, even when they end in conviction."

An alternative to court-handling of such disputes, Forst wrote, would be to substitute "effective community dispute centers for arrest and formal prosecution of cases involving family, neighbors and other nonstrangers."

## Judicial Culpability

The last reason for failed convictions cited by the study concerns judges. "Six percent of all arrests made in Washington do not end in conviction because the defendant flees after the judge sets bail conditions that make it feasible to abscond," Forst noted.

In addition, "7% of all arrests are dismissed by the judge without a formal adjudication," Forst wrote.

"Dismissal of a case provides signals to the prosecutor regarding judicial standards," he

noted, "and subsequent case dismissals by the prosecutor are likely to be made in recognition of these signals."

Another possible solution to the problem, according to Forst, would be to increase the number of convictions and offset that by reducing prison terms, since "it has been well established that the certainty of punishment is key to the control of crime."

Reduced prison terms would be especially effective for "older, less active offenders who tend to receive longer terms because their criminal records have had time to grow long," Forst said.

To analyze the large volumes of data required for this and other studies, Inslaw uses a Digital Equipment Corp. PDP-11/70 with 500K bytes of main memory and 350M bytes of disk storage and the SPSS, Inc. statistical software package as well as "locally grown" Fortran statistical programs.

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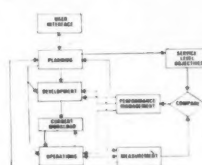
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# Congress Joins Brewing Battle

## Bill Would Curb USPS Role in Electronic Mail

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — Congress has joined the complex jurisdictional battle shaping up over the U.S. Postal Service (USPS) monopoly of letter delivery and its involvement with electronic mail.

Legislation introduced in the House of Representatives March 19 would "give the responsibility of defining first-class mail back to Congress," according to the bill's sponsor, Rep. Trent Lott (R-Miss.). The legislation is needed, he said, because USPS wants to extend its monopoly to "intracompany communications and data processing materials."

Recent USPS interpretations of the Private Express Statutes "have lumped everything from IBM cards to engraved tombstones under the same heading, requiring the item to be placed in an individually addressed envelope, sealed and stamped," Lott said.

The statutes restrict delivery of letters to the Postal Service in order to preserve the government postal monopoly. USPS recently proposed extending the laws to cover hard copies of messages sent by electronic means, regardless of whether the post office is the deliverer.

"The Postal Service's interpretation of the Private Express Statutes has justifiably aroused a great deal of rancor within the business community," Lott said. The USPS proposal also drew sharp criticism from the Federal Communications Commission (FCC) and the Justice Department.

Under the proposal, messages sent

via private firms' electronic equipment and then hand delivered in hard-copy form would have to be stamped and comply with other postal regulations, the FCC noted.

The USPS does not have the regulatory authority to extend its monopoly to electronic mail, the FCC said. The Communications Act of 1934 "specifically defines [electronic] communications to include the physical delivery of such communications," it stated in a March 12 letter to the Postal Service.

The 1934 law does not "view physical delivery of any electronic communication as a postal function but, instead, as part of a complete telecommunications service," according to the

FCC. "Congress, therefore, has explicitly conferred on the FCC jurisdiction over all forms of electronic communications and their physical delivery."

The FCC and the Justice Department warned the Postal Service its proposal could inflate the costs to the public of private communications services and hinder development of telecommunications services. It added that "the Postal Service . . . would be provided an unfair competitive advantage."

A Postal Service spokesman said the USPS is still receiving comments on its proposal and could not say when it will decide whether to proceed with extending the Private Express laws.

## Novel Describes Network Abuse

NEW YORK — A novel about how the Internal Revenue Service's national computer network is penetrated through a remote terminal and a Communications Satellite Corp. (Comsat) communications satellite has been published by Arbor House Publishing Co., Inc.

Authored by Clyde Matthews, *The Ides of March Conspiracy* projects what might happen if a group of civil libertarians — computer experts — were to invade a large network. In the book, it all happens as a protest against pending legislation aimed to interlock all government computer systems under unified federal management.

If this occurred, the Administration could access all private computer systems and data banks in the event of a national security threat, the novel postulated.

The novel was inspired in part by the U.S. Privacy Protection Commission hearings and its report published in the summer of 1977.

Reportedly based on actual invasions of privacy by the federal government and industry, the book speculates on what could happen without effective safeguards, Arbor House said. The book costs \$9.95.

## AMA Slates Security Course

NEW YORK — Executives who would like to learn how to deal successfully with computer crime can attend "Data Security — Protecting Against Computer Theft and Fraud," a course to be held here at American Management Associations' (AMA) headquarters April 9-11.

The course was designed to give executives a firm understanding of the potential illegal uses of computers and an awareness of how computer abuse can be prevented, detected and prosecuted.

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The Technology Analysis Group of Advanced Computer Techniques Corporation, the publishers of *Industry Measures*, has been carefully tracking developments of IBM's "future systems." As a follow-up to our well-received study, *IBM Systems in the 80s*, we are publishing a special edition of *Industry Measures* exclusively devoted to the IBM 4300 product line—its architecture, technology, key attributes, and how it will affect users, mainframe competitors, computer and components suppliers, and others . . . even IBM themselves.

The 4300 Report is written for all levels of management. It intends to eliminate much uncertainty and many of the misunderstandings and inaccurate information circulating about this new line of computers. In clear language, it explains the economics, marketing considerations, and other crucial details surrounding the 4300, and how these factors coalesce to help or hinder those who stand to gain or lose by the product's arrival.

- IBM users and potential customers—how will the 4300 affect their migration and growth plans? Should they rent, purchase, or lease?
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■ Minicomputer manufacturers—how will they fare when the full hardware software functionality of the 4300 is finally released by IBM?

■ IBM Corporation—what does the 4300 mean to them in terms of revenue growth and new business opportunities? Do they gain and lose something with the 4300's marketing strategy? Where does the new series fit in the corporate scheme of things? Does it conflict with or complement other major products, such as the Series 1, the 8100 Information System, and System 38?

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## Computer-Aided Technique Diagnoses Arthritic Knees

By Marguerite Zientara

CW Staff

AKRON, Ohio — Scientists at the University of Akron here have developed a computer-aided, electro-acoustical technique for monitoring and evaluating knee noises that promises to aid in the diagnosis and treatment of arthritis and other joint disorders.

Clinical examinations of arthritis, "the nation's most crippling nonfatal disease," according to Dr. Mamerto Chu, presently rely on such tools as biochemical studies and X rays.

Those techniques are very subjective and frequently unreliable," according to Chu, an associate professor in the department of mechanical engineering. Biopsies are more accurate, but are expensive and potentially hazardous because of their invasive nature.

While investigators have been trying since the 1880s to use noises produced by the moving knee as a noninvasive diagnostic tool, they have always given up eventually because of a lack of sophisticated equipment. "Those researchers mainly used the stethoscope," Chu noted, "but they could never remember exactly how the joint sounded the day before or the last time they listened to it."

In addition, early investigators were unable to remove extraneous noises such as skin friction, hand tremor and snapping tendons from the joint noise.

Five years ago, Dr. Chu, whose area of interest is "acoustics and vibration," joined forces with an orthopedic sur-

geon at the Akron City Hospital, Dr. Ivan Gradisar, and began working on what may become a standard diagnostic tool for joint diseases.

"We are working with the same main concept used 50 years ago; we just improved the system," Chu maintained. "We made it more sophisticated."

The system developed by the scientists made use of a double microphone assembly with a differential amplifier that cancelled out all extraneous noises in a "relatively quiet room," Chu said. Holding the microphone assembly against the patient's knee and applying very light pressure, the scientists tape-recorded the noises made by patients' free-swinging knees.

"The patient was asked to actively swing his leg at a fixed rate, following a swinging pendulum similar to a metronome," Chu explained. A marking signal was activated whenever the leg reached its most flexed position, indicating the end of one cycle on the recording.

Patients tried to maintain a uniform swinging rate of about three seconds per cycle (one flexion and one extension) for the most accurate soundings possible.

### A Look at Knees

The noises produced by the patients' knees generated waveforms on an oscilloscope in analog form, Chu observed. Such recorded knee data was converted from analog-to-digital (A/D) form by a Texas Instruments, (Continued on Page 19)

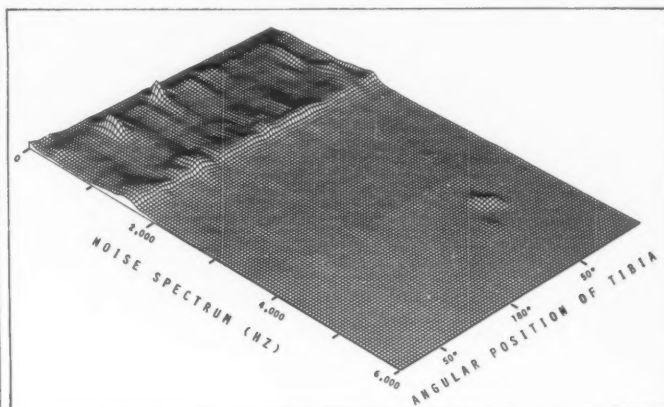


Figure 1

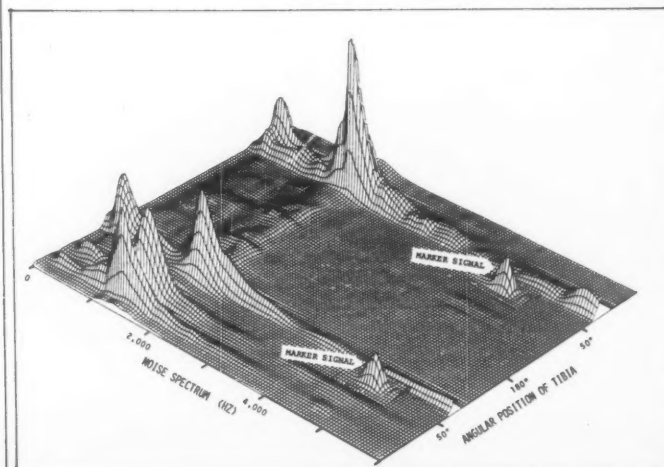


Figure 2



## Computer System Charts Arthritic Knee Noises

(Continued from Page 18)  
Inc. Model 960A minicomputer with 32K bytes of memory, at a rate of 12,000 samples per second, he noted.

Each completed cycle of the knee data contained 18 records, with each record consisting of 2,048 data samples.

A Tektronix, Inc. 4013 graphics terminal was used to monitor the minicomputer during the A/D conversion process and for editing the marking signals from the converted data, Chu explained. After the conversion, the digitized acoustic signals were analyzed, using two Fortran programs, by the University's IBM 370/158 with 6M bytes of main memory and 3G bytes of on-line disk storage.

### Mountain-Like Plots

Derived from the analyses were three-dimensional arrays, which were plotted into three-dimensional perspectives, indicating noise characteristics vs. time, by a Calcomp, Inc. Model 936 plotter.

Such diagrams, looking very much like mountain ranges, can show doctors the differences among, for example, normal knees (Figure 1), rheumatoid knees (Figure 2) and degenerative knees, Chu stated. They can also show the progression over time of one patient's disease.

These comparisons illustrate the diagnostic potential of the technique. A unique feature of the technique lies in the correlation between the knee's position and the noise emitted at any given instant, which help to locate the precise position

of any articular (joint) damage, Chu explained.

While the technique eventually could help to diagnose knee joint problems, it also would be useful in indicating the effectiveness or ineffectiveness of any drugs for the treatment of a condition, Chu said.

The scientists will undertake more extensive clinical testing beginning in June or July.

## Computer Congress Wants Papers For Melbourne, Tokyo Meets

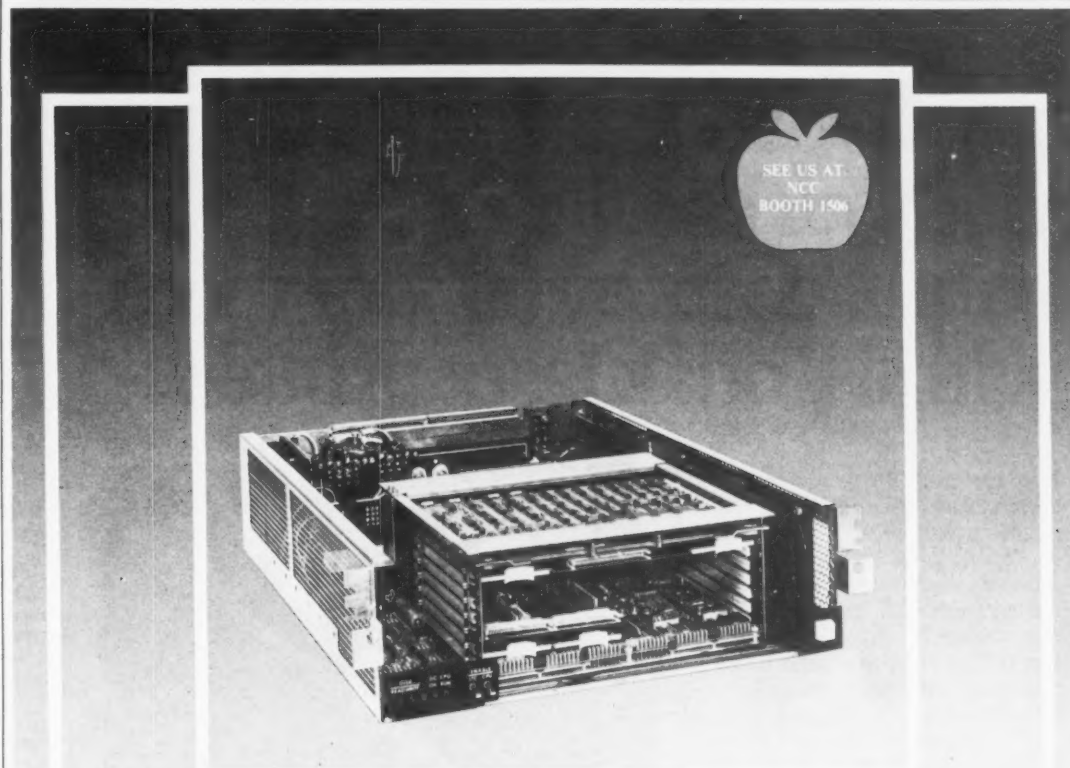
NEW YORK — U.S. participants are now being sought for the technical program of the Eighth World Computer Congress, to be held jointly in Melbourne, Australia, Oct. 14-17, 1980, and in Tokyo Oct. 6-9, 1980.

The conference is sponsored by the International Federation for Information Processing (Ifip), which recently put out a formal call for papers. These papers that are accepted will be delivered either in Tokyo or Melbourne or both, according to a congress spokesman.

Early registration for the technical meetings and equipment exhibitions for both congresses is \$244.

Registration information and copies of the call for papers brochure are available from the American Federation of Information Processing Societies at 210 Summit Ave., Montvale, N.J. 07645.

Further information is available from Donald F. Welsch of Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.



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## Calendar

April 28-May 3, Washington, D.C. — **Third Annual National Information Conference & Exposition (Nice III)**, sponsored by Information Industry Association. Contact: Nice III Headquarters, Suite 502, 316 Pennsylvania Ave. S.E., Washington, D.C. 20003.

April 29-May 2, New Orleans — **Tims/Orsa National Meeting**. Contact: Prof. Irving H. Lavalley, Tulane University, Graduate School of Business Administration, New Orleans, La. 70118.

April 30-May 1, Manchester, N.H. — **Cobol Programming Workshop**. Contact: Foundation for Continuing Education, Room 602, 15 School St., Boston, Mass. 02108.

April 30-May 2, Dallas — **Effective Computer Operations Management**.

Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

April 30-May 2, San Francisco — **Encryption for Computer Communications Security**. Contact: Technology Transfer, Inc., P.O. Box 49765, Los Angeles, Calif. 90049.

April 30-May 2, Orlando, Fla. — **1979 IEEE/MTT-S International Microwave Symposium**. Contact: College of Engineering, University of South Florida, Tampa, Fla. 33620.

April 30-May 3, New York — **Forms Design Course**. Contact: American Management Associations, 135 W. 50th St., New York, N.Y. 10020.

May 1-3, Toronto — **Data 79**, sponsored by *ComputerData* magazine. Contact: Whitsed Publishing Ltd.,

Suite 2504, 2 Bloor St. W., Toronto, Ont., Canada M4W 3E2.

May 1-2, Minneapolis — **The Art of Negotiating**. Contact: Negotiation Institute, Inc., 230 Park Ave., New York, N.Y. 10017.

May 1-3, Oklahoma City, Okla. — **1979 Southwestern Computer Conference**, sponsored by Oklahoma State University (OSU) Technical Institute. Contact: E.Z. Million, OSU Technical Institute, 900 N. Portland, Oklahoma City, Okla. 73107.

May 1-5, Philadelphia — **International Communication Association 28th Annual Conference**. Contact: Dr. Gerald Miller, Department of Communication, Michigan State University, South University, South Kedzie Hall, E. Lansing, Mich. 48824.

May 2-4, Washington, D.C. — **Federal ADP Procurement**. Contact: American Institute of Industrial Engineers Seminars, P.O. Box 3727, Santa Monica, Calif. 90403.

May 4, Oklahoma City, Okla. — **Executive Overview of Data Base Systems**. Contact: S.L. Robinson & Associates, 517 N. Pennsylvania Ave., Morrisville, Pa. 19067.

May 7-8, St. Louis — **Microprocessors for Managers**. Contact: American Institute for Professional Education, Carnegie Building, Hillcrest Road, Madison, N.J. 07940.

May 7-9, Orlando, Fla. — **Seminar on Third-Party Leasing Negotiations**. Contact: International Computer Negotiations, Inc., 1331 Palmetto Ave., Winter Park, Fla. 32789.

May 7-10, Chicago — **Design Engineering Conference**. Contact: Clapp & Poliak, Inc., 245 Park Ave., New York, N.Y. 10017.

May 7-9, Washington, D.C. — **Word/Text Processing Conference**. Contact: American Institute of Industrial Engineers Seminars, P.O. Box 3727, Santa Monica, Calif. 90403.

May 7-10, New York — **Basic Project Management**, sponsored by American Management Associations (AMA). Contact: AMA, 135 W. 50th St., New York, N.Y. 10020. Also being held May 7-10 in Kansas City and Seattle and May 14-17 in Dearborn, Mich.

May 7-9, San Francisco — **Integration of Word Processing and DP Systems**. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held May 21-23 in New York.

May 8-11, Atlanta — **National Micrographics Association Annual Conference & Exposition**. Contact: John B. Bidwell, Conference Director, 8728 Colesville Road, Silver Spring, Md. 20910.

May 9-11, Washington, D.C. — **Action Tools for Women Managers**. Contact: Management Resources International, Inc., 6621 Electronic Drive, Springfield, Va. 22151. Also being held May 14-16 in Stamford, Conn.

May 9-11, New York — **Data Communications: An Introduction to Concepts and Systems**. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held May 14-16 in Chicago.

May 11, Philadelphia — **Pascal and Microcomputers**. Contact: Educom, P.O. Box 364, Princeton, N.J. 08540. Also being held May 14 in Detroit.

May 13, San Diego — **The Educom Financial Planning Model**. Contact: Educom, P.O. Box 364, Princeton, N.J. 08540.

May 14-17, San Francisco — **15th Annual American Institute of Certified Public Accountants (Aicpa) Computer Services Conference**. Contact: Aicpa, 1211 Ave. of the Americas, New York, N.Y. 10036.

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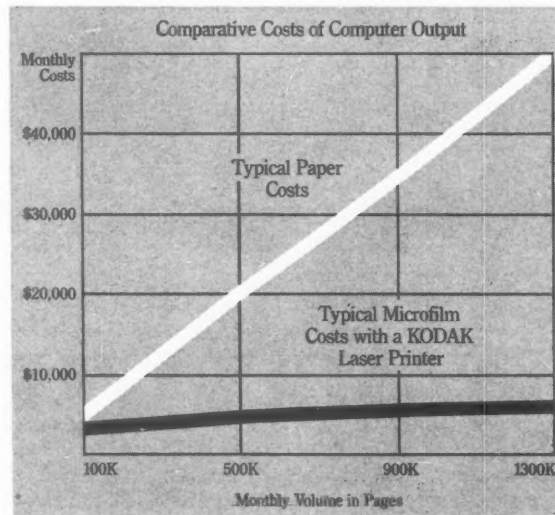
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The CW Calendar generally appears in the first and second issues of each month; events are listed a month in advance.

All conference announcements should be sent to Calendar, CW Editorial Department, 797 Washington St., Newton, Mass. 02160, at least six weeks prior to the month in which the event is slated to occur.



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# Editorial

## It Could Happen Here

U.S. government at all levels should pay close attention to the current strikes by DP professionals in the UK. British government DPeres are protesting the failure of UK agencies to match salary levels offered by private firms there [CW, March 26].

Public-sector programmers, systems analysts and DP managers in the U.S. face a similar situation, aggravated by inflation and government belt-tightening. A significant proportion may choose to join the better-paying private sector in coming years, leaving DP-dependent government operations in the lurch.

The U.S. cost of living will jump more than 15% this year if the current rate of increase continues. That dismal prospect was announced by the Carter Administration recently as it continued to exhort U.S. employers to not raise salaries more than 7%.

Although the private sector may win exemption from the 7% lid for its DP professionals [CW, Dec. 25-Jan. 1], federal agencies are expected to observe the constraint across the board. State and local governments are also likely to comply where DPeres are concerned because many of their operations receive federal subsidies and because they are faced with tax limits imposed in the past year by outraged voters.

If corporations fail to get exempted from the 7% ceiling, many will probably ignore the so-called voluntary lid — so long as it remains voluntary. They fear DPeres will "jump ship" and take more lucrative positions.

In the U.S., computing professionals are accustomed to annual salary hikes in the 12% to 20% range [CW, Oct. 30] and, like everyone else, they feel the sting of inflation.

The Society of Civil and Public Servants and the Civil and Public Services Association have report-

edly shut down at least 36 government centers in the UK; all these centers involve computer operations. The two unions are said to represent about 60% of the Crown's civil servants.

At first, the strikes did not affect the agencies on which Britons are immediately dependent, such as those which distribute welfare and pension payments. But the nation's massive social security operation at Newcastle was shut down for 48 hours after the government fired 39 workers for striking.

The unions have also disrupted the mailing of various types of payments to citizens and have reportedly interfered with a number of tax collection programs just prior to the deadline for settlements. Defense, agriculture, education and many other departments of the UK government have also had critical operations shut down by the strikers.

The Labor Party government may not survive the imbroglio, according to a number of observers.

The British predicament illustrates how dependent a national government can be on computer systems and the people who run them. In the U.S., all levels of government are assimilating computer technology precisely where operations are most critical as a means of improving agency efficiency and responsiveness to the public.

Local government computing has so far failed to meet these objectives in many cases, according to the recently completed final report of the Urban Information Systems (Urbis) Research Group. But the dependence of U.S. government on computing is undeniable.

There is an obvious and pressing need for U.S. government at all levels to support its investment in computer technology with salaries that will ensure a steady reserve of the talent needed to employ that technology in the public interest.



## Letters to the Editor

### Beware of the Operators

I had 10 weeks of keypunch training at the Joseph Keefe Technical School in Framingham, Mass. I learned about keypunching codes in order to keypunch program cards.

I am a data entry operator now, and I protest the lack of articles concerning keypunch operators in *Computerworld*. We are the backbone of the DP industry and are tired of being ignored.

We demand more articles on us overworked, underpaid, and unappreciated workers. Otherwise, we will slip a few extra characters into the next batch of cards that will make all the computers in the world self-destruct.

Dianna Portonova  
Marlboro, Mass.

### Head in the Sand?

Ed Farrell appears to be naive on the subject of prereleased information ["GSD-DPD Rivalry Hurting Users," CW, March 19].

If IBM were to "warn users" of new releases in any official way, it would fuel the antitrust fires against it.

If Farrell isn't already receiving this information informally, his head is in the sand.

Gilbert A. Powell  
Park Ridge, Ill.

### IBM in Defense of IMS

"Freeze on IMS Updates Predicted" told of a prediction by an independent consultant that IBM is likely to announce an imminent "freeze" on its Information Management System (IMS) as a prelude to the introduction of an alternative product [CW, March 12].

IBM does not ordinarily comment on its planned announcements but, within this constraint, we can assure your readers that this predic-

tion is without foundation.

Since the introduction of IMS, IBM has recognized the need for an evolutionary data systems direction. IBM has provided for evolutionary, orderly growth for IMS customers and will continue to do so in the future.

IMS has a good reputation among its users. Not only do a substantial number of our customers use IMS extensively, but it is also a key element in IBM's own internal DP.

Far from being a "source of embarrassment to IBM," we are proud of IMS as a cornerstone of IBM's family of data systems products.

E.E. Lucente  
Vice-President  
IBM Data Processing Division  
White Plains, N.Y.

### Stop the Crime Bill

In reference to "Ribicoff Urges Banks to Endorse DP Crime Bill," the senator was reported as saying that his bill will encourage financial institutions to report computer crime, which they don't do now from fear of embarrassment [CW, March 19]. Nothing in the bill requires reporting, hence it is unlikely that the bill will encourage reporting.

Ribicoff is apparently unaware that federal regulations already require banks to report all crimes to federal authorities. If there is a massive breakdown in enforcing banking regulations, as Ribicoff perhaps implied, a computer crime bill will not correct that problem.

But there is no evidence of such a breakdown. On the contrary, banks must comply with federal regulations scrupulously; to do otherwise would entail serious risks that no bank could accept.

The Ribicoff bill is very broad and vague and, therefore, dangerous.

I urge everybody to oppose it.  
John K. Taber  
Santa Clara, Calif.

## Data Past

### Five Years Ago April 3, 1974

NEW YORK — IBM went to considerable lengths during the late 1960s to keep — or install — its systems in "key prestige universities," according to internal IBM memos released as part of the deposition record of former Chairman T. Vincent Learson in the U.S. vs. IBM antitrust case. In addition to across-the-board educational discounts for installed systems, the effort apparently involved free machines to specific accounts and a tie-in of IBM research money to the amount of IBM equipment installed at a university or college.

WASHINGTON, D.C. — A computerized index of all the testimony taken by the Senate Watergate committee was turned over to the House of Representatives for use in

its Presidential impeachment inquiry.

### Eight Years Ago April 7, 1971

NEW YORK — A customer of a service bureau won more than \$1 million in damages as a result of the bureau's failure to perform its contracted obligations.

Law Research Service, Inc., which won the judgment against Western Union Telegraph Co., said it probably represented the largest amount awarded to date as a result of a company's failure to deliver computer services.

WASHINGTON, D.C. — The Selective Service System planned to use a computer data bank to fight draft dodgers and keep local draft boards operating efficiently.



## Reader Commentary

# Security a Farce in Many Installations

By Howard A. Karten

CW Staff

The debate over auditing now going on in these pages has yet to cover a related topic of considerable importance: hardware security.

In many installations, security is a farce. Security implementations are like some operating systems: more virtual than real. As a result, management often believes security is tighter than it actually is.

Lack of security is a problem because of the central role computers have come to play in most businesses. This critical role means that the value of the hardware to the insurer is far less than the value of the services it provides to the user. Hardware can be destroyed and replaced relatively painlessly; much information, once destroyed, is irretrievable.

Let's consider some aspects of poor security, drawn from my experience with large users. Some of the cases mentioned below can be ameliorated; for others, the mistakes have already been cast in concrete.

### Actual Cases

ABC Co. is a major force in its town and in its industry. Its hardware is housed in a modern, low concrete building with small windows, a few hundred meters from a major road. Internal security is certainly visible, if not completely effective.

The building, however, is vulnerable to terrorists. Several weapons delivery systems — government jargon for explosive-propelling devices — have been in use for literally hundreds of years. These delivery systems were available two centuries ago, when they were

more difficult to fabricate and there was no major worldwide trade in weapons; you can imagine how easy it would be to secure such a system today.

Explosives, too, have been around for centuries. It would be fairly easy for a terrorist or other malcontent to lob explosives into the building and then escape using the major main road.

Alternatively, the would-be saboteur could purchase a more modern delivery system at almost any large shopping mall; for less than \$150, explosives could be hurled with virtually no risk to the sender.

I do not wish to provide a blueprint for a sabotage for any misguided readers of *Computerworld* and therefore I am being purposely vague. But security experts with whom I have discussed these methods generally agree on their feasibility.

### 'Soft' Security

These two methods of sabotage are blunt and crude, and after you're in your brand-new computer center there's nothing you can do to protect the installation from these types of attacks. But what about beefing up "soft" security?

ABC Co. uses badge readers to control access to the computer room. Someone from the company visited the nearby XYZ Corp. and said he had inserted his badge in an XYZ badge reader out of curiosity.

Some curiosity. It worked, he claimed.

XYZ Corp. is interesting in its own right. Most DP managers have little reason to visit the computer room and because they're not technicians, usually contribute little to DP operations once there. In many

companies that use coded badges, however, the manager is routinely issued one.

Although one of XYZ's DP managers had a badge, he used it fairly infrequently. (Unlike most managers, he was a superb programmer/analyst and really did have a valid reason for having the badge; he was near-brilliant and usually made valuable suggestions when he visited the computer room.)

However, the 10 or so programmers on his staff, who were constantly going into and out of the room, shared three badges. (Whether this is a bad practice is a question that deserves separate treatment.)

As a result, the badges were passed from hand to hand. So much for the fancy logging of who went in what door and when.

Even this wasn't a major problem for XYZ programmers, though, since the cleaning or other maintenance people were perfectly willing, if asked, to "hold the door, please."

### What About You?

Do these conditions exist at your company? Are badges authorizing computer-room entrance issued on a "need to be there" basis, or is yours one of the one-in-a-hundred companies that has tried to overcome the politicking associated with badge issuance?

Perhaps your company also has a guard stationed outside the door to prevent "piggyback" entrances. Ask yourself two questions: If you have guards outside the doors, who are they? Is there someone in the building who routinely enters the room and who is, for all practical purposes, "invisible"?

Often, Harry the friendly guard at the door is bored — after all, his is not the most exciting job in the world — and he becomes more casual about checking identification.

Perhaps your installation has good guards and a badge system. Are you now invulnerable? Not likely; most large office buildings are grossly underprotected. The building itself could be attacked and rendered unusable.

One institution housed its computers in one of those modern, possibly fireproof, high-rise buildings in a major city. There was a fire (naturally — it's Murphy's Law), and somehow or other the floor holding the computer equipment was believed by firemen to have been weakened during the fire, although the floor itself was not where the fire had been. The company was using close to 100% of its DP power and had little to reserve.

A middle manager confided to me that if the company had been denied access to its system for as few as 24 hours, there was a good chance the institution could have been in very hot water with various regulatory agencies, and its backlog of work might have carried it under.

The point I am making is this: in our "age of information," mere protection of physical assets is not sufficient. The threats to security from sophisticated, would-be Luddites go far beyond destroying plastic and metal. And the management's response to these dangers has been insufficient. Many installations — perhaps most — are far more vulnerable than management believes them to be.

I'd bet a dinner at your favorite French restaurant on it.

## The Human Connection Simulation Pits Teams In Dream World Series

By Jack Stone

Special to CW

"Good evening, sports fans! Welcome once again to another game in the Dream World Series of Baseball. Tonight we bring you the play-by-play action of a match-up between two of the greatest baseball clubs of all time: the 1908 Chicago Cubs and the 1976 Cincinnati Reds."

You would have heard this most unusual announcement if you had tuned into radio station KGRC of Hannibal, Mo., a few weeks back. And you would have heard nine thrilling innings of a game between two of the best baseball teams in history — a game that never really took place.

The production was brought to the public through the courtesy of three enterprising broadcasters who employed the "magic" of computer technology and

some expert showmanship. As the first of occasional stories on off-beat applications of computers, I interviewed Larry Schaffer, the station manager, who told me the story behind the program:

"KGRC is primarily a contemporary music station, which features the Top 40 rock selections. But twice a week, as a change of pace, we have a sports 'call-in' show, with Mike Lawrence and Jeff Myers of our staff as co-hosts. It turns out that this show has become very popular because Mike and Jeff are very knowledgeable about the American sports scene and approach the program with great enthusiasm.

"Not too long ago, we installed a Wang Laboratories, Inc. mini-computer to assist us with the scheduling of our programs and

(Continued on Page 28)

## The Taylor Report Performance of Toner Rests on Secret Pigments

By Alan Taylor

Special to CW

Interested in calculating the present and future cost of toner in proportion to the cost of printer equipment, I decided to visit Aunyx, Inc.'s laboratories in Hingham, Mass., in February.

At Aunyx, a toner manufacturer, I found myself peering into microscopes, comparing toner supplies for laser printers. Its representatives claimed that Aunyx toner lasts longer and costs less than comparable toners. They cited tests performed by customers that reportedly showed this.

Certainly the cost and quality of toner is pertinent to users of non-impact, high-speed printers.

At Aunyx, I learned about the different plastic resins used in toners. Users of equipment from IBM, Xerox Corp., Siemens Corp. and other firms can learn much

about toners by noticing where and how much "dirt" collects in different parts of their printers.

I looked at samples, listened to details about user tests and reviewed material and labor costs.

Negotiating a computer contract? Next week, Taylor passes on a suggestion from a user-lawyer.

I was told that the pigments, the grouping of carbon blacks used by the toner manufacturer, are trade secrets.

Many possible combinations of carbon blacks exist. They are usually grouped into channel blacks and furnace blacks.

The other powders, making up 80% or more of the toner, act as a vehicle for the pigment, bringing

(Continued on Page 32)

# Computer Science Ph.D. 'Glut' Nonexistent

By John W. Hamblen  
Special to CW

We see frequent references to the Ph.D. market "glut." There may indeed be a surplus of Ph.D.s in some fields.

There are extreme shortages in others, however. Computer science, for example, has far fewer Ph.D.s than the country needs.

Ask any computer science department chairman who has vacancies to fill — and most of them do. Ask any of the firms which have been unable to fill all their positions in spite of heavy recruiting.

The U.S. universities are producing fewer than 350 new Ph.D.s per year against an estimated need for more than 1,300 per year. Yet very little is being done by the National Science Foundation (NSF) or anyone else to narrow the gap.

NSF fellowships are being allocated among disciplines on the basis of numbers of applicants rather than national needs. Furthermore, computer science does not even rate a separate category, but is considered a subdivision of applied mathematics.

California is the only state which is producing more Ph.D.s in the computer sciences than its estimated need. Illinois comes close, producing 85% of its estimated need, followed by Maryland with a 73% rate and then Iowa at 61%. More than half the states are producing none at all. Many universities and companies are making do with personnel trained in other disciplines.

## Reasons for Concern

Why the concern over a shortage of Ph.D.s in computer science? Our concern is not only for the Ph.D.s. There is a severe and continuing shortage of graduates with bachelor and master degrees in computer science, and there is need for qualified faculty who can give quality instruction at these levels.

The U.S. colleges and universities are turning out only about one-sixth of the B.A.s needed and less than 10% of the needed M.A.s. No state is even close to producing enough graduates at either level.

The situation is quite different at the two-year and post-secondary vocational levels. These schools are again producing more than the estimated need. It is only the severe shortage at the four-year level that prevents a visible "glut" in the two-year and other post-secondary vocational graduates.

In particular, California is producing more than three times the estimated need and Florida and Mary-

land nearly twice their need. Surpluses exist in Alaska, Colorado, Hawaii, Illinois, Michigan, Missouri, New Jersey, Oklahoma, Tennessee, Texas and Wisconsin.

## Reader Commentary

Computer science programs flourished in these states because of the expansion of the junior and community colleges during the 1960s and, more recently, because of the emphasis on vocational programs. Federal funds have boosted these programs, while practically

no support has been given to the development of four-year and graduate computer science programs.

### Inattention Explained

It is easy to speculate on why the computer sciences are not getting federal attention. I offer the following explanations:

- Lack of representation on such policy formulation boards and in such advisory groups as the National Science Board and National Academy of Sciences groups.
- Lack of new funds for higher education in general, forcing the computer sciences to compete with the established disciplines for reallocations. Colleges are beginning to deal with this, but there is no indi-

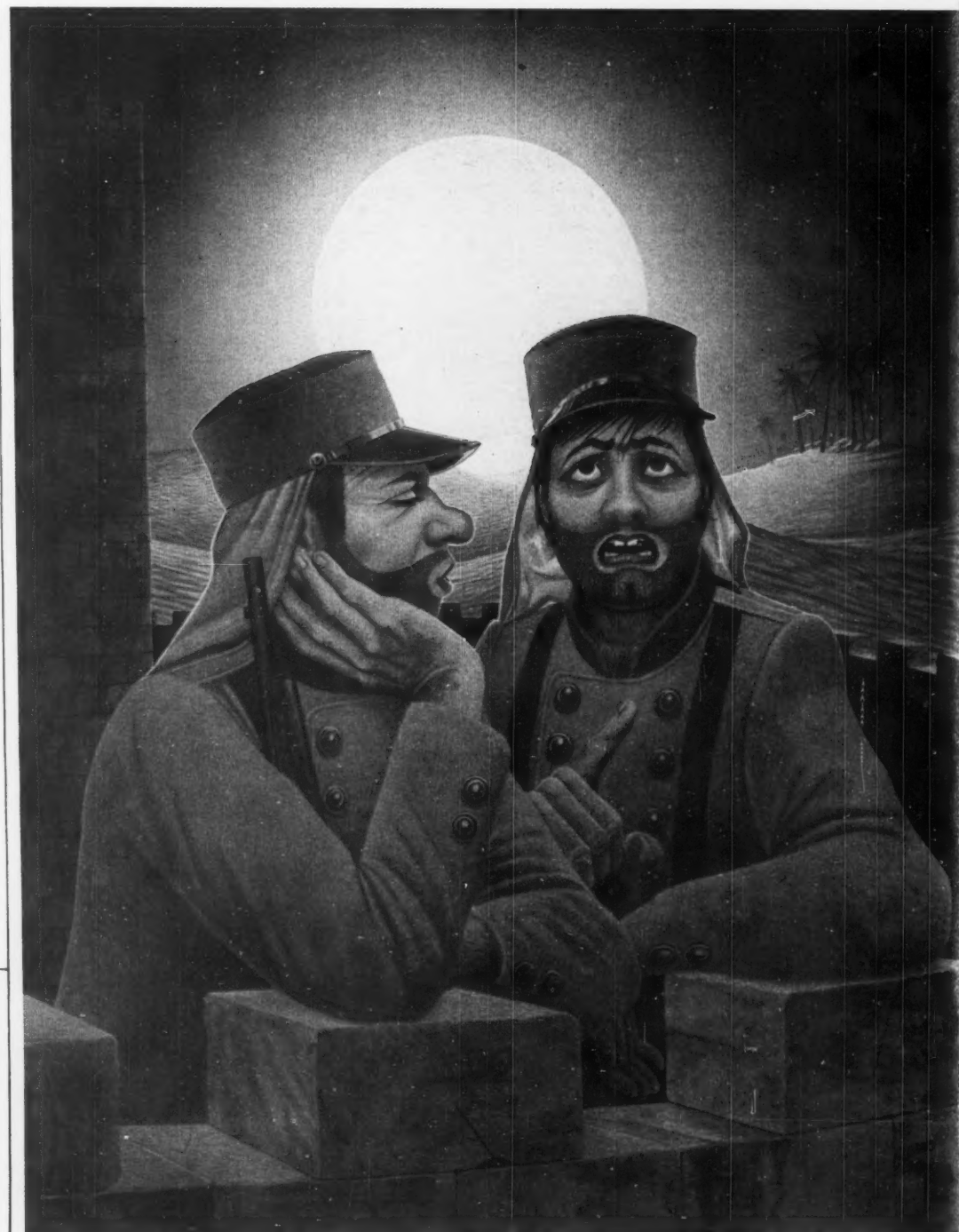
cation that the federal government is ready to face the problem.

• Failure to distinguish computer science as an area separate from mathematics.

I hope writers will be more specific in their future references to supply and demand for graduates at all levels and in particular the Ph.D. level. We need to be better informed. Once informed, those of us in power must act.

The supply and demand discussion must evaluate each discipline separately — and please, let's not hide the computer sciences under mathematics.

Hamblen is chairman of the Computer Science Department at the University of Missouri in Rolla, Mo.



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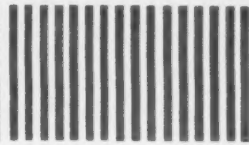
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# The Role of the Non-Auditing Auditor

## Programming Standards: The Good and Bad

By Robert L. Glass  
Special to CW

There are some good things and some bad things to be said about programming standards.

The good things are that standards can be used to define and enable the use of all that is best in software development. Code produced to an effective set of standards is more readable and maintainable, for instance, than code produced willy-nilly without rules or regs.

But the bad things about standards

### Sociology of Computing

are pretty bad. All too often, standards are a one-man band of favorite personal habits of the standards definer. Worse yet, they may be an amalgam of unmeshable favorite personal habits from a crew of standards definers.

That's what happened, unfortunately, at Softpro. Someone up in the penthouse offices decided that Softpro should have some corporate coding standards. Harvey Flipswitch, a Softpro veteran of 20 years, was told by the Powers That Be, "Go and invent us some standards."

"Any specifics?" Harvey asked  
"No, except I want Jim Youngfellow,

the new Ph.D. from Ivygrad, to work with you," was the answer.

Harvey's heart sank. Youngfellow's computing knowledge was profound, emerging as it did from the best available textbooks of his time, but it was also astoundingly untempered by reality. Youngfellow had joined the company, for instance, with the avowed intent of doing a proof-of-correctness analysis of the Softpro-produced Quadranova PL/PI compiler. The whole thing.

And Harvey had been unwise enough to laugh in Youngfellow's presence when he heard it.

Youngfellow had failed in his

quest, of course, and miserably, but he still remembered the humiliation of that laugh. The two of them, thought Harvey wryly, would make a great standards team.

"One more thing," The Word continued. "I want an auditor built so we can enforce those standards."

"Damn," Harvey thought to himself. An auditor, he knew, was a piece of software designed to measure other software's conformance to a standard. Harvey found them distasteful — or worse. They were essentially the policemen responsible for enforcing the onerous standards.

### Tactical Error

In spite of his misgivings, Harvey set to his task with a good deal of energy and enthusiasm. He authorized a literature search on the subject, made a few contacts at other companies to see what their standards were and met with Jim Youngfellow to decide how to divvy up the labor.

The meeting was even-tempered but icy — Jim would complete the literature search, they decided, while Harvey went on with his industrial contacts. Then Jim would draft the standards definition report while Harvey began the auditor design. And they would touch base with each other periodically to keep in sync.

But Harvey made a tactical error. He was so busy contacting old friends and designing his auditor that he let his contacts with Youngfellow slide. Until, one day, he came to realize that he had let them slide too far.

### Management Loved It

Youngfellow had reviewed all the literature on software standards, made a first draft of a proposed Softpro standard and, full of enthusiasm for the chance to steer the Softpro programming effort for the next few years, had shown the draft to Top Management. Without showing it to Harvey first.

Management had loved it. Especially the part about using only structured coding constructs and never, on penalty of possible termination, coding a GOTO. And limiting procedures to 57 lines of code, and nested statements including

(Continued on Page 28)

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# Simulation Pits Teams in Dream World Series

(Continued from Page 23)

commercial. Along the way, we started talking about the possibilities for using its capabilities to advance our sports show, and we hit on the idea of simulating the Dream World Series of baseball.

"So here's what we did. First, we invited the listeners to forward nominations for the 10 best baseball teams of all time. We sorted them out and came up with a schedule of 10 play-off games to select the two finalists who would then do battle in a four-out-of-seven-game World Series.

"We encouraged our audience to listen by offering a pair of season tickets to the person who correctly guessed the two teams in the World

Series and came closest to the final scores.

"To build the simulation, we assembled vast quantities of performance statistics on all the players on each of the 10 teams. We entered lifetime averages into the machine. For the batters, these included percentages of strikeouts, hits, types of hits, etc. For pitchers, we used lifetime averages of hits, walks, strikeouts, etc.

"We play a game in two phases. The first is a simulation run on the computer in advance of a radio broadcast. In this phase, Mike and Jeff play the roles of coaches of the opposing teams. They have the usual decision-making choices of roster, pinch hitters, base stealing,

etc.

"Once a certain batter 'comes to the plate,' however, a random number is thrown by the computer, which will advance him or not, depending on past statistics of both pitcher and batter.

"We have also incorporated computer-selected choices for base running, including runners-on-base and types of outs. A score card of the game is kept, which provides a complete record of the action.

"In Phase 2, Mike and Jeff enter the roles of sportscasters and broadcast the game as it could have happened, following the score card of Phase 1. To give the game credibility, they read up on the backgrounds of the players, the history

of the clubs and the gossip in the league, then liberally sprinkle this color in their delivery. We also use recordings of crowd noises to make it seem as real as possible.

"I have to say that the response of the listeners has exceeded our wildest expectations, so much so that we are thinking about writing simulation programs to pit all-time great sports performers in football, boxing and horse racing.

"But what makes the program so exciting is that Mike and Jeff really become emotionally involved in the game. And why not?

"They are the only radio announcers around today who have the opportunity to describe two all-time Dream Teams in hot competition."

## Standards: Good and Bad

(Continued from Page 27)

FORs, IFs and procedure CALLs to a depth of 5.

### The Real Bearcat

Harvey choked on his auditor decision tables when he heard about it. Those standards would be hard to live with, he knew. Oh, 90% of the time they'd be no problem. But the other 10%? Some procedures just plain had to be larger than 57 lines of code, and some GOTOs couldn't be wished away.

But those weren't the problem. The nesting limitation on Proc calls was the real bearcat.

A good modular program nests Proc calls all over the place. Far from improving the code quality, that particular standard would force an overhaul of good programming practices into bad.

Harvey was aghast. He cursed the day he had ever let Youngfellow get out of control.

### An Idea Sprouts

Out of control. Gaining control. An idea began to sprout in Harvey's fertile mind. Management may have had the last laugh on the standards. But his auditor had the last laugh on enforcing them.

When the auditor went on the air several weeks later, it came complete with a shiny new user's manual and a Top Management directive requiring its use on all Softpro software.

But why was there a sardonic smile on Harvey Flipswitch's face? Only he and a few trusted compatriots knew about the undocumented auditor option which adopted a forgiving look at standards violations. With the option on, Harvey knew, the most onerous of the standards were simply not checked.

Short of reading the code itself, Management would never even know it was happening.

Harvey felt a little guilty, sometimes, realizing he was undermining Management's control.

But not nearly as guilty, he realized, as he would have felt playing the enforcer to an absurd set of standards.

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## Basic Research at NBS Of Nobel Prize Quality

Since I'm a laser researcher and not a computer expert, I can't comment with authority on Herb Grosch's March 5, National Bureau of Standards evaluation of (NBS) computer activities, but I can comment on other parts of his article.

From my own limited experience on an NBS advisory panel for a few years, I think Grosch may be correct that it took some kicking and screaming before the physicists and chemists at NBS faced up to some of the practical issues of metrication, fire prevention and building standards.

What I'd just like to add is that in my, I think, well-informed opinion, the basic physics and chemistry research that was and — to an unfortunately reduced extent — still is

being done in Ambler's old operation in Boulder and in Gaithersburg is very, very, very good and is indeed a national resource. The very best of this research is, I think, of Nobel Prize quality, or very close.

I can't assess what "dirty secrets" may be held by the NBS leadership, but the working-level scientists I know fairly well are as highly qualified and as highly dedicated a group of basic researchers as you can find. What they do benefits the nation in the short and in the long run. If they don't belong at the bureau, it's the nation's loss.

Again, I can't speak for or against Grosch's assessment of what NBS did or didn't do, should have done or shouldn't have done, about com-

puters and computer standards. But if he thinks the basic physics and chemistry research at the bureau isn't superb, doesn't serve the nation or doesn't belong there, then he's wrong.

A.E. Siegman

Stanford, Calif.

## No Confusion Intended

I have just read Herb Grosch's Feb. 12 article about commercial seminars masquerading as professional society ventures.

Grosch singled out a company called "State of the Art Seminars." My company, Infotech, has been connected with the phrase "State of the Art" for 10 years to describe our

computer-related conferences and publications.

However, we are in no way connected with "State of the Art Seminars" with the practices described in Grosch's article. In fact, Grosch has participated in many of our events and would, I am sure, regret any unintended confusion that may have been caused.

Dave Bates  
Director

Special Events Division  
Infotech International Ltd.  
Maidenhead, England

## The Real Problem

The ongoing discussion about extending the Zip Code to nine digits should include an evaluation of previous changes made to the system by the post office.

Many five-digit Zip Codes already have been changed to different five-digit codes (as opposed to merely adding codes to previously undeveloped areas). Were these changes really cost-justified in sorting improvements, considering the indefinite exception handling procedures required for such changes?

What help was given for mailing lists maintained for out-of-town addresses? We have tried — without success — to obtain a national directory of the changes already made.

If the proponents of change are not charged with an evaluation of past experience (and all the costs), will we ever reach stable addresses again?

Tom Tarrant

Hunt, Texas

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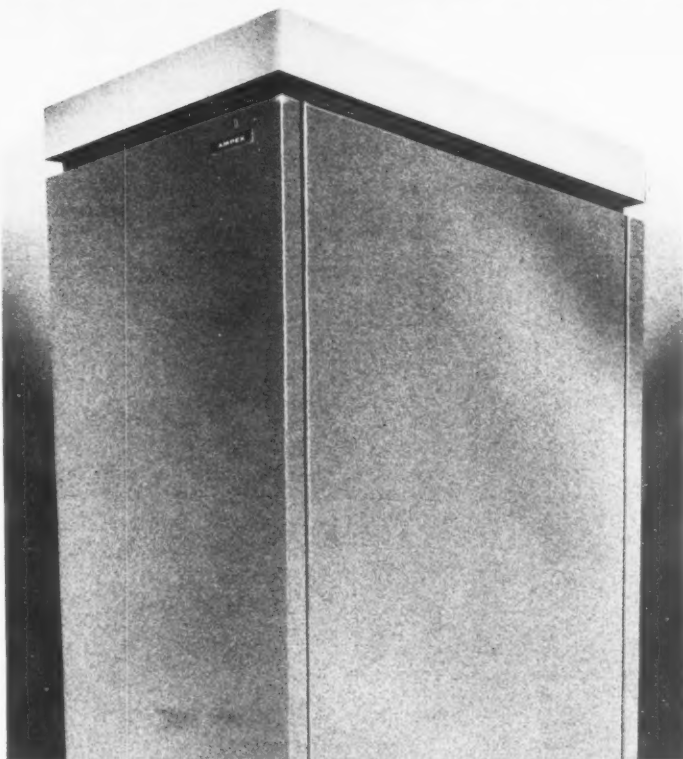
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## Contact Rifle Group For Opposing Opinion

"System to Monitor Flow of Firearms Shot Down" [CW, March 19] carried only the Bureau of Alcohol, Tobacco and Firearms (ATF) disclaimer that a system which is indexed by serial number is not a registration system. At best, that position was misleading to the public and Congress.

I urge you to more fully research and evaluate statements of agency personnel, especially in regard to major computer systems which would impact the personal privacy of millions of Americans. Where a reasonable doubt of validity exists, opposing viewpoints should also be presented.

I suggest that *Computerworld* contact Harlon Carter, executive director of the National Rifle Association,

for a responsible and authoritative opposing opinion.

Rolf T. Moulton

Syosset, N.Y.

## In Defense of Operators

In response to John Enright's letter [CW, Feb. 26], I would like to ask him about operators being "handy scapegoats" who "lack the means of self-defense." Could it be that he thinks of operators as lower class citizens of the DP community, who are not worth listening to when there is a problem?

While he is busy making accusations, the operators are trying to get work done and meet deadlines rather than defending themselves.

Enright stated, "It is much easier to take a programmer and make him into an operator, rather than vice versa." He forgot that the majority of today's programmers started as operators not many years ago. I would hope that we don't become so swell-headed as to forget

our roots in the DP field.

I must agree with Enright that in competition programmers might "blast the operators out of the water" when it comes to "theoretical understanding of the computer and its operating system." However, if I had my choice, I would rather be around operators who believe in reality than programmers who deal in theory.

W.J. McDonald Jr.

Metairie, La.

## Performance of Toner Hinges on Secret Pigments

(Continued from Page 23)

it to the shot-metal carrier, which takes it to the electrically charged image areas. These powders, or resins, are carefully chosen for their

electrical, heating and fusing capabilities as well as for their granular size.

Perhaps most important, the quality of the image and the throughput per dollar depend on the pigments selected and how they are mixed.

At Aunyx, I asked whether a user could depend on getting the same pigment mixture each time he received a box of toner from the same manufacturer. I was told that the user couldn't make that assumption and that neither Aunyx nor any other toner manufacturer could tell him.

I thought that a label such as "contains miracle pigment X-Blue-4" would ensure the user of getting a standard ingredient and also protect the trade secret. But that was not the case. I found out that pigments are always changing.

### Cleaning Up Production

It seems that about 10 years ago, environmentalists saw dangers in the way channel blacks were manufactured, and the manufacturers were ordered to clean up the process. The manufacturers got extensions, but eventually these ran out. They couldn't find a way to clean up the manufacturing of this group of carbon blacks.

About two years ago, the carbon black manufacturers simply stopped making channel blacks. Today some firms are starting to make them again, but the product is quite different.

Meanwhile, the toner industry changed pigments; most of them switched to furnace blacks. But supply problems plague most industries, and the toner manufacturers are no exception.

Toners are controlled by the varieties of available carbon blacks. The quality of the toner supply that you put into your printer is ruled by the carbon black market and by the skills of your supplier's chemists.

Based on my calculations, the cost of toner compared with the total cost of the printer equipment can only go up as hardware costs come down.

Whether Aunyx has a superior product (it may well have) or whether other independent suppliers' toners equal or surpass those of the computer manufacturers, it is a good idea for users who have these printers, as well as computer procurement people, to familiarize themselves with the facts about toners.

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"Produces error-free code."  
"Improves readability."

#### COBOL/QDM for quality assurance, documentation and maintenance helps enforce standards.

"Cleans up many of the things that a programmer may forget to do."  
"Helps us enforce details like alignment, paragraph numbering, level numbering, common names, etc."

#### COBOL/IMS for data base language interface cuts coding time by 50%.

"We developed a data base interface using MetaCOBOL. The lines of code required using our interface were only 70% of that required for the same pro-

gram coded using CALLs to the data base system. More importantly, the coding time was only about 50%."

#### COBOL/CP for COBOL-to-COBOL conversion dramatically reduces conversion effort.

"Our conversion effort took only a quarter of what we had estimated."  
"With MetaCOBOL, the entire conversion operation was virtually transparent both to applications programmers and to our clients."

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## Packages Built for Series/1

N. HOLLYWOOD, Calif. — An on-line business system including a number of integrated applications areas, an on-line laboratory system and a pair of utilities have been developed by Applied Computer Services, Inc. (ACS) for users of IBM's Series/1 minicomputer.

The business system runs under IBM's Real-Time Programming System (RPS) and includes modules for order entry, billing, accounts receivable, inventory control, sales analysis and general ledger. Accounts payable support will be available soon, a spokesman said.

The ACS laboratory system covers the same range of applications, but with modifications appropriate to the clinical

work to be done at the user sites. Modules include order entry, billing, accounts receivable, work-in-progress and sales analysis.

While CRT terminals are used for data entry in the laboratory system, off-line processing is used to print such things as customer statements, receivables and receivables aging, insurance billing and patient bills and to back up the on-line master files, the spokesman noted.

One of the utility packages includes dump/restore functions between disks and Datum, Inc. tape drives. Other routines in this package provide selective restoration of volumes from tape to disk or copying of specified data sets either from

tape to disk or vice versa.

A text editor package is said to support multiple users from remote terminals. It backs Ascii units either through modems or local attachment cables at speeds from 300- to 9,600 bit/sec. All editing facilities plus job submittal are supported.

The business system costs \$17,500 to \$19,500, depending on the modules required. The on-line lab system cost \$20,000. The Datum tape utility can be purchased for \$500 while the text editor costs \$20,000.

All are also available on monthly lease plans, the spokesman noted from ACS at 12200 Sylvan St., N. Hollywood, Calif. 91606.

## Indepedent Enhances 'DOS/MVT'

SAN FRANCISCO — Geared for large-scale IBM mainframes, Software Pursuits, Inc.'s Release 7.2 of its DOS/MVT operating system boasts remote job entry support, a procedure library function and Isam for IBM 3330 model 11s and 3350 processors.

The current version includes support for 12 dynamically allocated regions, the capability to catalog and process library maintenance in all regions concurrently, direct-access storage device (Dasd) support for all 370 disk devices on 360s as well as 370s and a spooling system that incorporates class scheduling, tape spooling, early print start

and multiple routing, a spokesman said.

DOS/MVT's procedure library support allows cataloged JCL procedures to be stored in DOS source statement libraries and to be retrieved and presented to the job control processor at high speed, he claimed. The support also features keyword and positional parameter substitution for overrides of existing procedure values.

Said to be more powerful than IBM's MVS/Hasp, DOS/MVT uses conditional JCL and variable symbol substitution to automatically adapt JCL procedures to reruns and other special run conditions. In addition,

failing jobs can automatically restart themselves without operator intervention, the spokesman noted.

### RJE Support

RJE support is available for all IBM 2780-, 3780- and 2770-compatible workstations and is a component of the spooling system. Up to 35 stations can be supported simultaneously, and work can be routed to and from single terminals or groups of stations under a multiple routing arrangement.

The spooler itself, an integral part of Release 7.2 includes memory requirement reductions, performance improvements, a reader exit, a page separator exit, additional job accounting data, spool commands entered as job control, additional report printing flexibility and a Hasp-like job scheduling routine, the spokesman said.

All of the enhancements under Release 7.2 are available to current users of Software Pursuits DOS/MVT at no extra charge. The entire software system rents for \$700/mo on a month-to-month basis from the vendor at Suite 2008, One Market Plaza, San Francisco, Calif. 94105.

## Shop Routing/Capacity Planning Added to 'MS-11' for PDP-11s

SUNNYVALE, Calif. — A Shop Routing/Capacity Planning module has been developed and is now available from NCA Corp. to extend MS-11, its Manufacturing Information Software that runs on Digital Equipment Corp. PDP-11s in RSTS/E environments.

The shop routing portions of the module provides the user with on-line information about routing, work centers, tooling and machines within a production facility, according to a spokesman.

The capacity planning routines include a "rough cut" view of current and future capacity requirements and a detailed analysis of labor and machine requirements for work-in progress, he said.

The just-released module is intended to become an integral part of MS-11, which already includes modules in support of inventory control, purchasing, bill-of-material processing, work order status, manufacturing cost analysis and requirements planning.

The entire MS-11, including Shop Routing/Capacity Planning, costs \$60,000. The latest module can be acquired by installations that already have the earlier package for \$7,000, NCA reported from 388 Oakmead Pkwy., Sunnyvale, Calif. 94086.

## DBMS Supports Micro Users

ST. LOUIS — Programmers working on the Ohio Scientific, Inc. line of microprocessors have become three to five times more productive with the Key/500 data base management system (DBMS) from Sauer Computer Systems, Inc. than without it, a Sauer spokesman claimed.

The degree of improvement varies with the training and experience of the individual, Sauer was quick to acknowledge, but the rigid programming practices required by Key/500 make development much easier in the long run, the spokesman asserted.

The formality of the program created in the Key/500 environment cuts back sharply on the whole problem of documentation, he said, adding that programmers can read each others' coding directly, without having to study program notes ahead of time.

Sauer expects to make the Ohio Scientific hardware-Key/500 software combination available to other firms to market to users. So the company did not provide information about the cost of Key/500 by itself.

Sauer is at Suite 601, 1650 S. Brentwood Blvd., St. Louis, Mo. 63144.

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# Utility Billing Package Adapted to NCR I-8150

DAYTON, Ohio — Geared to handle water, sewage and garbage records for organizations serving up to 4,000 accounts, NCR Corp.'s interactive utility billing software can now be used on the firm's entry-level I-8150 systems.

The package reportedly enables municipalities or public utilities to respond quickly to customer queries. It also manages the paperwork associated with billing and customer re-

cords.

The system was designed to lead the operator through each transaction or data entry task via programmed instructions displayed on the I-8150's screen.

All pertinent records and files are updated as data is entered, a spokesman said.

## Calculates Bills

The software also calculates utility bills, based on table or

consumption rates, and updates all financial records. Special messages such as changes in rates, new billing information or "Season's

Greetings" can also be printed on a bill.

Previously, the interactive utility billing package was only available for NCR's

larger I-8200 systems.

The one-time cost for the software is \$3,000 from the firm at S. Patterson Blvd., Dayton, Ohio 45479.

## For Application Development

# Intel Acquires Rights to 'Taps'

SAN FRANCISCO — Intel Corp.'s Data Products Group has acquired the exclusive

marketing rights to Decision Strategy Corp.'s Transaction Processing System (Taps), an

on-line package that is said to facilitate application development, maintenance, tuning and production operations.

## Target Machines

Designed for IBM 360, 370 and 30 series mainframes as well as IBM-compatible CPUs, Taps can run on all versions of IBM operating systems.

It can also interface to several teleprocessing monitors and data base systems, an Intel spokesman stated.

The on-line system can also provide communications monitoring services for a processor if no monitor is presently in use.

The Taps system features dynamic screen definition, which permits applications design at the terminal and eliminates many intermediate program and screen development steps, the spokesman continued.


## Query Language

The system also has a query language and report generator to facilitate data access and reporting directly from a terminal.

The software package has a perpetual license agreement price range of \$25,000 to \$40,000.

First customer deliveries begin immediately, the spokesman said from One Embarcadero Center, San Francisco, Calif. 94111.

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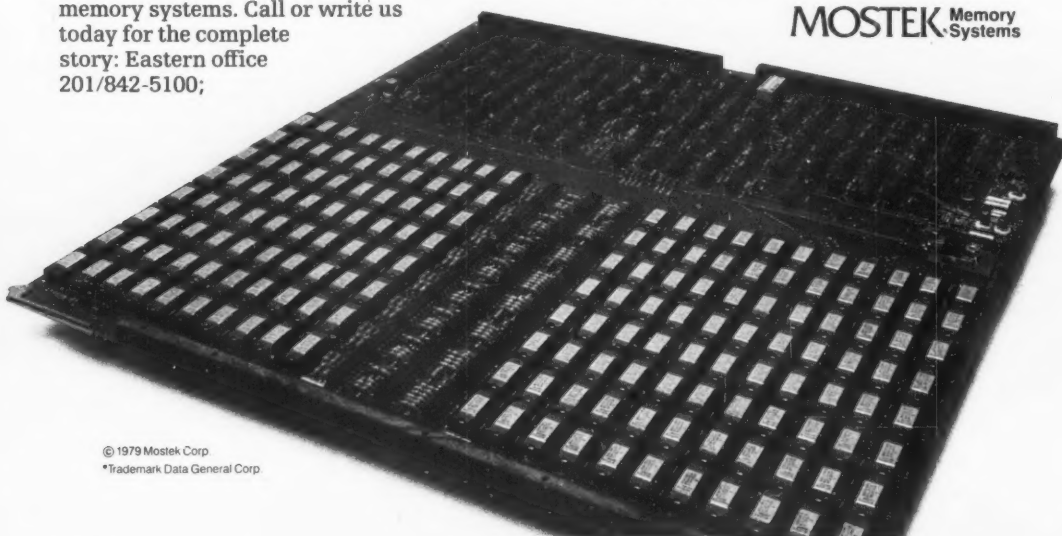
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## How Long for a Run?

# Simple Desk Timing Can Expose Faulty Design

By Stephen L. Robinson  
Special to CW

I was recently called in to evaluate several proposed data base system designs at a manufacturing company. I was presented with proposed file structures and an excellent, comprehensive list of all the reports, maintenance runs and queries which were to utilize the files at whose design I was looking.

### Data Base Corner

The first major report, a weekly run, looked like a potential disaster. After assessing expected volumes for the weekly run, I asked the analyst how long he thought the run would take. He was quite taken aback by the question. Clearly, this was only a tentative design; the programs had not yet been written, and therefore even trial runs against test files were impossible.

"How about a simple desk timing?" I suggested. "We can figure out the approximate number of disk accesses by studying the logic of the application and by knowing the basic architecture of the data base package."

A few quick calculations later, we were able to state with some confidence that almost three hours of channel time would be required for the report. Not only would the report be expensive in computer resources, it would take an excessively long clock time as well.

A bit of redesign of the file structures, along with some modifications of the system logic, reduced the estimated channel time to about 10 minutes. That such a reduction was possible is not all that surprising. Many long-time users of data base packages who have never really bothered to understand their packages' architecture make design errors of similar magnitude. Since this was a first-time use of the package, the design oversights were understandable.

What is not understandable, however, is the lack of an answer to "how long will this take to run?" I have, over the last several weeks, sought similar answers from other design teams.

With the exception of one real-time project (where the major design effort was directed to response time), the answers were similar: "We'll know when we run the test cases."

By then, of course, it's too late to do anything but tune an already bad design. Most, if not all, of the coding has been done, and project managers are understandably reluctant to discard programs for the now-recognized-as-faulty original design.

After all, they say, falling back on the oldest cliché in the industry, "the programs work." They're certainly not going to get rid of them on the say-so of some scratchings on a piece of paper.

That's all "might be" statistics; they have working programs. End of discussion; the old design stays.

### Simple Detour

The way around that scenario is quite simple. Whatever the system design review process employed by your organization, add (if it doesn't already exist) analyses of the times for major processes.

It's not difficult. If you are using an acquired software package, you should understand it well enough to make a rough estimate of the I/O associated with various package facilities. If you can't make such an estimate, go back to school; you're operating at a significant disadvantage."

Desk timings, the so-called "might-be" statistics, can be quite accurate. Even allowing for variations because of operating system idiosyncracies, one can certainly ascertain enough information to pass preliminary judgment on a design.

Once a standard part of any system design, desk timing is not obsolete. Use the technique. It can save you from tuning badly designed systems later on.

### Quick Is Not Cheap

Shifting gears only slightly, a few words about systems analysis — again. We all know, or should know, that in the pursuit of a signed contract, hardware and software representatives say funny things, not all of which are true or even possible.

Of late I have encountered numerous organizations which were sold a bill of goods by package vendors. The problem crosses package boundaries and includes report writers, query languages, data base packages, teleprocessing packages, data dictionaries and programming languages.

The vendors are stressing reduced development times. Interfaces are developed to speed up development

times, high-level calls are being replaced by even higher level user-oriented languages, all in the name of getting the system up in a hurry.

But what is it that one can get up in a hurry? Senior management, impressed by CRT demos in which files are loaded and accessed in the course of the demonstration, will not sit still for long system development times.

Since they have seen with their own eyes how easy it is to use their new wonder package, they frequently tolerate no argument. Object at the peril of your job.

But there are no shortcuts to effective data and information systems; there are no wonder packages in the marketplace ready to solve all your problems. Systems analysis, data analysis and even an occasional desk timing of a physical design are not things of the past.

If your management is laboring un-

der delusions of rapid transitions to a new era, leave this article on their desk (anonymously, of course). Remember, if you put up a system, your name is forever associated with it.

The real problem, however, is not associated with the systems analysts, but with the package vendors. It is the friendly vendor who has lunch and plays golf with senior management — not the technical staff, which will have to live with management decisions.

Senior management should spend more time communicating with their own people rather than with vendors. Even if the vendors are right, they will not be involved with installing and maintaining a systems approach.

If your people are not comfortable with a particular system approach, the odds are you are heading for trouble, even though the vendor's advice was sound.

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but he had another pair!**

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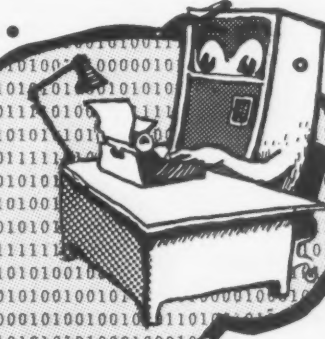
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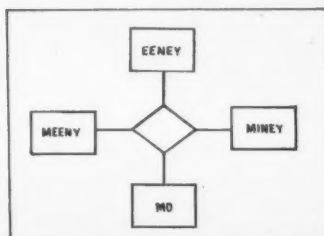
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## Screen Design Backed For IBM Series/1

W. MONROE, La. — Utility Computing Services, Inc. has unveiled an on-line screen design software package for the IBM Series/1 operating under the Real-Time Programming System (RPS). The package allows full interface between the IBM processor and the firm's 4978 and 4979 CRT stations, a spokesman said.

The program was developed to reduce the time spent by programmers in getting their application programs running under RPS by performing operational forms and company formats on the terminals' CRT screens, he explained.

The package allows the CRTs'

screen displays to be designed and modified, on-line, to suit user formats.

The screens do not have to be inserted into the application programs — they can be written in any language supported by IBM's RPS. The system reportedly has the capability to add screen designs, maintain existing screens, rename existing screens and print out all screen designs.

The software system's object code is available for \$500 and the screen design source listing sells for \$1,500 from Utility Computing Services at Suite C, 2000 N. 7th St., W. Monroe, La. 71291.

## Courses by Informatics Explain 'Inquiry/IMS'

CANOGA PARK, Calif. — Two one-day courses designed to help management, accounting and clerical personnel understand the operation of Informatics, Inc.'s Inquiry/IMS and IBM's IMS software are currently being offered by Informatics.

"Introduction to Inquiry/IMS" covers software concepts, inquiry statements for typical job requests and directory capabilities for saving and reusing inquiries and arithmetic functions, a spokesman explained.

The "Inquiry/IMS Installation" course details software implementation, the interface between the software's data definition language and IBM's data definition language, con-

struction of a directory for on-line applications and security requirements and restraints.

Each course combines lectures with hands-on exercises. They can be taught at the customer's location, at Informatics' training center here or at several regional training facilities.

The total price for each one-day course, including all student materials, is \$1,000 for groups of up to 15 people. Classes at regional training centers cost \$100 per student.

Detailed course descriptions on Inquiry/IMS and other software subjects are available from the company at 21050 Vanowen St., Canoga Park, Calif. 91304.

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**3 Time Limiting** — Runaway jobs, whether production or testing, are bad news, especially when nobody realizes they are happening. The TIME LIMITING feature prevents runaways and gives you a chance to control your system productively.

**4 AUTOLOG** — Get your auditors off your back. Secure your DOC file by a totally automatic, timer-driven dump of the DOC file to an on-line

back-up file. Your DOC file can now be really secure.

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## Wang Users Get Ledger Package

ANDOVER, Mass. — Users of Wang Laboratories, Inc. 2200VS business systems can now install a general ledger and financial reporting package from Software International, Inc.

The package gives accounting and financial personnel an interactive, data base-oriented system including a report writer for designing, implementing and controlling their own reports. "Roll-up" and spreading versatility to perform dollar summarization "in an unlimited number of directions" are other facilities, a spokesman noted.

Based on packages Software International has offered large-scale computer users for a number of years, the Wang version provides a range of preselected, standardized reports in addition to any the user wishes to create through the report writer.

Auditor-approved control techniques are another aspect of the package, the spokesman added.

The package costs \$15,000 from Software International at Elm Sq., Andover, Mass. 01810.

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## Designer Stages 'Ruptures' Model Tests Piping in Nuclear Power Plants

Special to CW

SAN FRANCISCO — Ensuring the survival of safety-related electrical and mechanical equipment in nuclear power plants is the goal of a company here that uses a software modeling program to stage hypothetical system failures.

EDS Nuclear, Inc. has provided engineering, management and technical support for the design and construction of nuclear power plants since 1969 and has assisted in the construction of more than 100 nuclear projects throughout the world. Although the firm developed its own software to test a plant's structural integrity, piping safety and restraint design, it also uses a modeling program on Control Data Corp.'s Cybernet remote computing service.

Cybernet's Relap4/Mod5 program tests a nuclear power plant's safety equipment by duplicating the increased temperature and pressure that follows a pipe rupture. Even though the disaster is taking place only within the firm's CDC mainframe, the program demonstrates whether a facility's safety equipment can withstand emergency conditions.

### Ruptures Modeled

"These analyses are performed to make sure there are enough pathways to direct the release of steam away from critical electrical and mechanical components and to control the temperatures and pressures to acceptable limits," according to Dr. Ronald J. Baschieri, a technical specialist in the company's Project Development Division.

A typical nuclear power plant contains some 210,000 feet of piping, of which about 70,000 feet must undergo rigorous stress analysis to show that the piping can withstand the effects of weight, thermal expansion, seismic motion and stresses caused by the flow of fluids.

Relap4/Mod5 calculates unsteady, multiphase flows of liquids and gases. Although the program uses one-dimensional equations to depict the flow between volumes, it permits the interconnection of a large number of volumes, giving the user an acceptable three-dimensional representation of the actual situation, Baschieri stated.

"Relap4/Mod5 provides air flow capability, permitting us to simulate the initial conditions. With previous Relap versions, the initial air conditions in a room had to be taken at equivalent steam density, but that's only an approximation.

"With Relap4/Mod4, rooms are modeled as filled initially with air, then a pipe rupture is postulated that intro-

duces steam and the air-steam mixture moves out through the various rooms," Baschieri said.

"If the resultant environmental conditions exceed design limits, we can recommend changes. Critical equipment can be moved, room placement, geometry and passageways altered and heating, ventilating and air conditioning systems modified to control the steam flows. Dampers and doors can be added that close under temperature and pressure signals to isolate the steam from critical equipment."

EDS Nuclear has also employed Cybernet's Relap program to solve problems in new areas of nuclear power plant design and evaluation.

"Relap inherently has the capability to solve problems beyond those for which the code was originally intended," Baschieri said. "We use it in applications that most people normally cannot and, because of this, EDS Nuclear has a long history of using the code with CDC."

CDC has modified Relap to help EDS Nuclear solve specific problems. One of these modifications was made when EDS Nuclear discovered the program was improperly picking up data in a water packing option.

"We were in a real crunch, working on a critical path problem, and a whole plant was being delayed," Baschieri recalled. "Once we and CDC diagnosed

the problem, CDC brought in the people to solve it.

"It took only a couple days, and things were fixed. We were able to get back on schedule and meet our deadlines."

### Quality Assurance Audited

CDC also provides extensive quality assurance for Relap to ensure that the program performs as designed and that such verification is documented.

"Quality assurance is one of the most important things in the nuclear business," according to Dr. A. K. Vaish, EDS Nuclear's manager of advanced technology development. "It is neces-

(Continued on Page 38)

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## Package 'Fits' Micros, Prepares Tax Returns

NEWPORT NEWS, Va. — Soft-One has developed a Federal Income Tax System (Fits) for the use of professional preparers of tax returns. Consumer versions of this interactive, disk-based system will also be made available, the vendor noted.

Written in Basic for use on various microcomputers, Fits performs the calculations for and then prints Internal Revenues Service (IRS) forms 1040 and 1040A as well as Schedules A through G, R, RP, SE and TC when they are appropriate.

An option is provided to print computer-generated forms on lined paper in accordance with IRS regu-

lations contained in Package X, he said, noting that IRS approval has been requested.

The program requires at least 70,000 bytes of disk storage and less than 16K bytes of random-access memory. A CRT terminal is desirable; a line printer allowing vertical spacing of 6 line/in. and horizontal spacing of 10 char./in. is required.

Fits is distributed for \$285 on North Star Computers, Inc. or Micropolis, Inc. full-sized floppies under CP/M or on Radio Shack TRS-80 or Apple Computer, Inc. compatible disks.

Soft-One is at 315 Dominion Drive, Newport News, Va. 23602.

## Pipes Tested by Modeling

(Continued from Page 37)

sary for us to have confidence in the program and also to conform with licensing requirements."

EDS Nuclear has audited CDC's quality assurance program and found it to be satisfactory, making it unnecessary to redo procedures that have been completed and documented, Dr. Edward Wais, project development manager, said.

"Quality assurance of computer programs is very difficult," Wais pointed out. "If you make a modification to the program, you're pretty much obligated to run all of your quality assurance cases over again. Our audit showing CDC's quality assurance to be satisfactory takes a lot of burden off us on this program."

In another modification to Relap,

CDC and EDS Nuclear worked together to incorporate a postprocessor that translates Relap's thermal-hydraulic results to dynamic fluid forcing functions for use as input to such EDS-developed piping analysis programs as Superpipe.

Like Relap, Superpipe complies with requirements of the Nuclear Regulatory Commission and the American Society of Mechanical Engineers and American National Standards Institute codes for nuclear and fossil fuel power plants.

In addition, Superpipe was developed not only to perform the engineering calculations required in piping stress analysis, but also to assist the engineer in optimizing design.

"The program is tied to the way engineers do their jobs," J.B. McCarthy, manager of the Piping Analysis Division, said. "They can operate it in phases and store data, then come back to use it again. Another benefit is that the engineers can use data in the way it comes to them, instead of having to make a lot of hand calculations to suit the program."

Areas in which EDS Nuclear is breaking new ground are nonlinear analysis, substructuring and probabilistic structural analysis.

The Advanced Technology Development Division is working on new substructuring capabilities to allow more detailed analysis of many problems. "Take the example of a gravity platform during an earthquake," Vaish said. "Some soil directly under the base mat becomes nonlinear while the rest of the system remains linear."

"You can use the rest of the system as a substructure, or giant finite element, model the nonlinear region in great detail and solve it in precise detail with nonlinear analysis. To date this has been almost impossible to do because of the lengthy computer time required."

EDS Nuclear also is developing standards and analytical techniques for probabilistic evaluation of nuclear power plant systems.

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## Despite Dearth of Data

# Users Seen 'Filling in Blanks' on Xten

By Ronald A. Frank

CW Staff

NEW YORK — Very little information is available about the proposed Xerox Telecommunications Network Xten network, and Xerox Corp. is releasing few operating details about the proposed service. Nevertheless, users can make some intelligent assumptions about the extent to which this service will answer their needs.

That was the consensus of opinion among speakers at a recent Xten seminar sponsored here by the Yankee Group.

Ralph Dement, manager of corporate network services at Digital Equipment Corp., said Xten does not appear to be a real-time network; instead its services offer store-and-forward capabilities. Dement reviewed

the three areas mentioned by Xerox in its Federal Communications Commission (FCC) filing, which included document distribution, data communications and teleconferencing.

Although batch file transfer and interactive computing were listed under data communications applications in the filing, Dement said the system's capacity is inadequate for the first, but the network does appear to be responsive enough for the second.

### What About Short Distances?

Under document distribution, great potential exists for electronic mail to replace written documents. While the system seems suited for this type of usage, the transmission patterns are wrong, according to De-

ment.

Studies at DEC showed that 80% of "inter-people communications" takes place within a company at a distance of up to 600 yards. One-fifth of the remaining 20% travels within a campus environment among company buildings, while the rest is long-haul traffic. But the Xten filing said very little about the short-distance transmission of messages, the area of greatest need.

Xerox obviously will concentrate on facsimile since it has been in this equipment area for a long time, he indicated. But even here little is said about short-distance, intracity document transmission. Most of the emphasis is on long-haul usage.

Xten is somewhat adaptable to teleconferencing, but it is not clear how much use business will make of this application. A voice application has not been mentioned for Xten, but the bandwidth may be limited for this type of use, Dement cautioned.

Before a user evaluates Xten, a study of the company's "organizational geography" should be made, Dement advised. On balance, it appears that Xten is aiming to upgrade information exchange from a textual to an image base, he explained.

### Regulatory Problems

Dr. Charles Jackson, a staff engineer with the House of Representatives Subcommittee on Communications, discussed the regulatory problems that were raised by the Xten filing.

Xerox has proposed that applicants be allowed to enter the proposed electronic message service (EMS) only when they are prepared to serve 100 cities. This would limit EMS carriers to only the largest organizations.

But if individual licenses are required for

## Independent Peripherals Mixed With IBM Mainframe Lower Firm's Terminal Response Time

DENVER — Applied Data Systems, Inc. (ADS), an on-line interactive service bureau in the Denver area, has speeded customer service and improved terminal response time by using a system leased from an independent vendor.

ADS, which offers on-line distribution and legal services, recently installed a wide variety of Memorex Corp. equipment and an IBM mainframe. The result, according to Michael Mulligan, ADS president, "is an economical system that offers fast throughput, flexibility and reliability."

A subsidiary of Devon Group, Inc., ADS has 27 customers throughout Colorado. The bulk of its business involves distribution applications for liquor companies, wholesale office supplies and retail store chains. The firm also provides various accounting applications for legal firms.

In the distribution area, the firm offers applications for inventory, invoicing, accounts receivable, financial statements, sales analysis, payroll and general ledger.

ADS went into business in 1969. At that time, it had an IBM 360/20 with two programmers, two keypunch operators and a computer operator.

As ADS began to grow, the firm started sharing a 370/135 with another organization. In 1975, the firm moved into its current location and acquired its own 370/125.

"It wasn't long, however, before the mainframe was overloaded," Mulligan noted. "At that time, we were using IBM 3340 disk drives, and our terminal response time was

from 36 to 40 seconds — terribly slow for most of our customers."

ADS' first effort to alleviate this problem was to install Memorex 3640 disks in October 1977. According to Mulligan, the firm replaced four IBM 3340 disk drives with six Memorex drives — two additional drives for approximately the same cost.

The independent drives brought the response time down to about 20 sec. But this wasn't fast enough for ADS' applications.

The firm realized it needed more power, especially more memory. Working with Memorex, ADS leased a 370/145 with 256K

(Continued on Page 40)

## IBM Adds Financial Terminal

WHITE PLAINS, N.Y. — Geared for account updates, loan expediting and other banking functions, the IBM 3604 Model 7 financial terminal can display up to 1,920 char. of customer data and is compatible with the firm's 3600 finance communications system and 3270 CRT terminals.

The terminal was designed for desktop use and can display individualized bank forms on its CRT screen and later print the information via an optional IBM 3615 printer.

The terminal uses existing IBM 3600 Vtam or the Advanced Communications Function (ACF/Vtam) support under IBM's DOS/VS, OS/VS1 and OS/VS2 MVS operating systems, a spokesman noted. Because the administrative terminal is compatible with

both the firm's 3600 and 3270 units, the capabilities of both can be provided to bank branches using communications line.

The terminal's keyboard consists of 99 keys in four groups: typewriter layout, adding machine format and two special function groups, the spokesman said. The unit's screen can display 167 upper and lower case letters, numbers and special and international characters in an 80-char. by 24-row format.

Users can install the terminal, which has self-diagnostic capabilities, the spokesman added.

The 3604 Model 7 can be leased under a five-year agreement for \$110/mo or purchased for \$2,800.

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## Remote Batch Terminal Added to Harris 1600 Line

DALLAS — A disk-based remote batch terminal, said to be the most advanced of Harris Corp.'s 1600 remote batch line, reportedly features expanded memory, local batch processing, Cobol and sort/merge capabilities.

The Model 1630 can be configured with Harris' recently announced 1600-02 Model II processor, operating at 1.25 million instruction/sec, according to a spokesman.

By supporting up to 128K of MOS memory, the Model 1630 reportedly provides concurrent processing of communications, utilities and local batch applications. It accommodates users desiring greater throughput capabilities, more communications lines, local batch processing and local report development without communications with a host computer, Harris said.

The unit also supports dual plotter interfaces, enabling plotting to be performed concurrently with other remote batch operations.

The Model 1630 can be field-upgraded to Harris' models 1650, 1660, 1670 and 1680 distributed data processing systems and can be configured with the firm's recently announced IBM 3741 and 5230 emulators as a data collection center or concentrator, the spokesman said. With either of the emulators, data can be collected, pro-

cessed and edited by Cobol, then forwarded to the host computer.

Under Harris' Extended Communications Operating System (Ecos), the Model 1630 is said to provide multi-programming capability with memory allocation, job loading and device assignment. A set of utilities for disk file backup and maintenance are included with the operating system.

### Available Disks

Disks available include 6M- and 12M-byte cartridge disks and 12M-, 24M- and 80M-byte Winchester-type disks. Other available peripherals include 150- to 300 card/min card readers, 100- or 200 card/min card punches, 300- to 1,250 line/min chain and drum printers and 7- and 9-track tape drives.

A Model 1630 unit configured with a 6M-byte cartridge disk and 300 line/min printer costs \$46,000, with a one-year lease price of \$950/mo and maintenance costs of \$180/mo.

A 12M-byte Winchester disk version, including an 800 bit/in. tape drive and a 600 line/min printer, costs \$64,000.

Harris Corp.'s Data Communications Division is located at 160001 Dallas Parkway, P.O. Box 400010, Dallas, Texas 75240.

## Controller Allows Plotting From Remote Harris Devices

SANTA CLARA, Calif. — Versatec has introduced a remote plotting controller that permits Harris Corp. 1600 remote batch/remote job entry terminals operating under Versaplot software to utilize Versatec printers, plotters and printer/plotters.

Under software control from the host computer, data is processed and compressed, then transmitted over data communication lines in encoded raster format via the Harris terminal to the controller. While the terminal performs other tasks, the controller decompresses the encoded raster data and controls the plotting or printing function, a spokesman explained.

The asynchronous, serial RS-232C data is input at rates up to 9,600 bit/sec and output at speeds of up to 18K byte/sec. Versatec's output devices offer printing speeds up to 1,000 132-column line/min and plotting speeds up to 10.2 sq ft/min, the spokesman added.

The controller's front-panel controls include power on/off, reset and mode with diagnostic controls, mode and interrupt. The system includes self-test diagnostics.

The controller is priced at \$6,000 from Versatec at 2805 Bowers Ave., Santa Clara, Calif. 95051.

## Unit Built for Hotels, Motels Aids Front-Desk Accounting

DAYTON, Ohio — Designed to handle front-desk accounting chores for motels and hotels, NCR Corp.'s microprocessor-based lodging terminal can perform normal posting, printing and transaction control functions and includes a matrix printing system.

The NCR 2251 succeeds NCR's Model 42 electromechanical hotel/motel system. Although the two systems are the same size and have similar keyboards, the 2251 offers several enhancements, a spokesman said.

For instance, it includes a 40-column single dot matrix printer for validation and journal printing and a full 90-column matrix printer for hotel guest folios, he noted.

The terminal can also store up to 48 10-digit totals, which can be tailored to

individual hotel/motel needs, and can store separate totals for three cashiers. A control feature offers an automatic check-digit verification procedure that reportedly prevents most transposition errors, incorrect room numbers and wrong balance pick-ups.

In addition, the system can be programmed so additional guest folio entries, such as those for a restaurant or valet bill, can be inserted into the terminal and validated by the system printer at the same time the folio is being printed, the spokesman noted. The 2251 also calculates any taxes or service charges that are necessary.

The front-desk accounting terminal costs \$5,950, with systems service including programming, training and systems testing at \$850.

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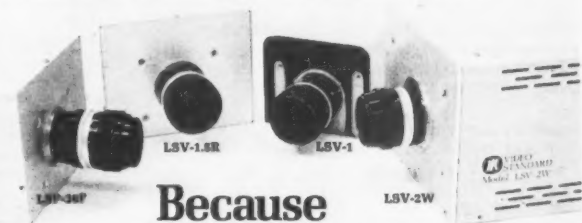


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## Installed in Agents' Offices Portable Terminals Tap Real Estate Data Base

McLEAN, Va. — More than 100,000 realtors and realtor associates throughout the U.S. are providing their customers with up-to-the-minute property listing through Planning Research Corp. (PRC) Realty Systems here.

Data terminals are helping PRC to bring real estate listings into the homes of prospective buyers. With the data terminals, realtors have instant access to local real estate data stored by the Multiple Listing Service (MLS) in their local computer center.

Information on new listings and sales is entered into the system by realtors through their terminals. Sales agents can then match the needs of prospective buyers with available real estate.

As supplier of on-line computer systems to the real estate industry, PRC is placing computing power at the point of need — in some 7,000 offices and 70 MLS around the country.

A realtor searching the home market for a customer dials up the host computer over conventional phone lines and is answered by a computer tone. The agent then inserts the telephone receiver into a Texas Instruments, Inc. 745 portable terminal's built-in acoustic coupler; the terminal, in turn, automatically identifies itself to the computer by transmitting a preselected office code.

The agent is now on-line and able to "talk" to the host computer. As he en-

ters a request on the keyboard, the computer responds by prompting the user for information in order to build a profile to meet the buyer's needs.

For example, the agent may request a four-bedroom house with two bathrooms, a family room with a fireplace and a double garage located in a particular neighborhood and priced in the \$70,000 to \$80,000 range. The computer responds with matching listings first from the agent's own office, then from his firm's branch locations and finally with listings from other companies.

The system and the terminals do not stop at property selection. Their functions can help put the buyer into the

right house at the right price by estimating the loan amount and the sale price the buyer can afford. The estimate is calculated from the buyer's income, his debts per year or month and his available cash.

These variables are entered into the terminal and, after computer processing, tables are generated which list each type of possible financing, the down payment, closing cost, loan amount and price suitable for that buyer. A seller may also generate his net profit after all costs are deducted from the sales price.

Individual offices for the entire MLS network can generate statistics on total listings, average price, sales activity, average days on the market and percentage of cooperative sales. In addition, PRC's on-line system provides computerized accounting and membership data.

The terminals are used to input information into the accounting and membership data systems that are maintained by the MLS or Board of Realtors.

The terminals have taken much of the paper work out of the real estate business. Both buyer and seller now have access to more timely information and services, according to a PRC spokesman. Listings have immediate exposure, and agents are kept up-to-date on all market activity.

The real estate agent, as well as the office manager, now has more time to spend with the real business of real estate — pursuing sales with people — and less to spend on the filing and sorting of paperwork, he said.



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## Trendata Adds Devices to Run At 1,200 Bit/Sec

SUNNYVALE, Calif. — Trendata Corp. has introduced a medium-speed terminal capable of printing on-line at 1,200 bit/sec. Transmission speeds to 4,800 bit/sec are possible using X-On/X-Off protocol.

Called the Trendwriter 350, the terminal uses a microprocessor to control print quality. A bidirectional printing feature accommodates speeds up to 165 char./sec avoid buffer overflow or data loss at 1,200bit/sec.

Other features include double-wide characters, adjustable forms tractor, an optional APL character set and full horizontal and vertical forms capability.

The Trendwriter 350 is compatible with Bell 103, 202, 212A and comparable modems and can use X-On/X-Off, coded character and reverse channel protocols, a Trendata spokesman said.

Trendata is also offering an upgrade kit which will increase the capacities of the Trendwriter 300 to the equivalent of the Trendwriter 350. The kit is field-installed and is priced from \$995.

The basic Trendwriter 350 costs \$2,990. Both the kit and terminal are also available on one-, two-, and three-year leases, with Trendata-supplied maintenance.

Trendata is at 610 Palomar Ave., Box 5060, Sunnyvale, Calif. 94086.



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# Datapro Slates Variety of Courses This Month

DELRAN, N.J. — A series of data communications courses ranging from basic concepts and systems to advanced network design will be offered in various parts of the country this month by Datapro Research Corp.

The first course, dealing with effective data communications network design, will take place in New York April 16-18 and focus on a number of quantitative principles, techniques and practice in network analysis and structure, according to a Datapro spokesman. Material will be presented on both switched network and private-line systems, batch and transaction processing and on both half- and full-duplex protocols.

A substantial amount of class time will be spent applying classroom

theories to practical problems in network design, the spokesman said.

Advanced data communications concepts and systems will be the topic of a seminar slated for San Francisco on April 23-24. This session is designed to update system designers or managers on what's happening in the data communications field, the spokesman said.

Digital transmission systems, data link controls and other areas will be addressed, with an emphasis on application significance.

While not a how-to-do-it type of program, the seminar will serve as an orientation review of key data communications factors and price/performance aspects and as an intensive overview of developments and their poten-

tial and significance, the spokesman claimed.

## Seminar on Distribution

In Los Angeles on April 23-25, Datapro will host a three-day course on distributed computer systems and their relevance to various organizational structures. The seminar will provide a basic understanding of distributed communications, processing and data bases and focus on the advantages and disadvantages when compared with batch or centralized teleprocessing systems.

The session is targeted for the DP decision- and policymaker. It will cover minicomputer systems, distributed communications, system implementation, performance requirements

and a variety of products and case studies, the spokesman pointed out.

Finally, in San Francisco again, Datapro will repeat its New York network design seminar, covering the same topics and going over the same material for its Western audience.

Registration fees for all the courses are \$455 for current Datapro subscribers and \$495 for nonsubscribers, including session materials and luncheons. When three registrants from a single company register for the same seminar, a fourth registrant from the same company can attend free.

If a participant pays the registration fee at least 30 days before the course begins, 10% is deducted from the registration costs.

Discounts are also available for a single attendee who registers for two or more seminars. These discounted fees are \$425 per seminar for Datapro subscribers and \$475 per course for non-subscribers.

Additional course information and schedules can be obtained from Datapro 1805 Underwood Blvd., Delran, N.J. 08075.

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## Program Allows DEC Processors To Transfer Files

BELTSVILLE, Md. — RDA, Inc. has introduced the File Transfer Program (FTP), which allows operators to transmit and receive data between two Digital Equipment Corp. LSI-11 or PDP-11 processors using asynchronous communications on a local or remote basis.

FTP runs under DEC's RT11 and RSX11-M operating systems and uses standard DLV11- and DL11-type serial interfaces. The system uses a defined protocol similar to those found in binary synchronous protocols, such as IBM 2780 and Hasp, and provisions are included for error checking and data retransmission when required, according to a spokesman.

Loss of line is detected via time-out for serial interfaces without modem control; error detection is accomplished by parity checking, block count and checksum routines, he said.

The communications program provides the following file functions: Transfer file from the host computer to a remote system, receive file from remote, change host to remote and vice versa, set slave mode or initialize to remote, exist to monitor and log message to remote console, the spokesman explained.

Although data transfers over telecommunications lines are generally limited to 1,200 bit/sec the software asynchronous communications method offers lower hardware costs than synchronous transaction types, the spokesman said.

FTP is available with either a customized computer system to fit an exact application or as add-on software for present LSI-11 or PDP-11 configurations.

The cost of the basic software license is \$1,250, with each additional remote package priced at \$250 from the company at 5012 Herzel Place, Beltsville, Md. 20705.

# Researchers Predict, Demonstrate Denser, Faster Bubble Memories Coming

By Howard A. Karten

CW Staff

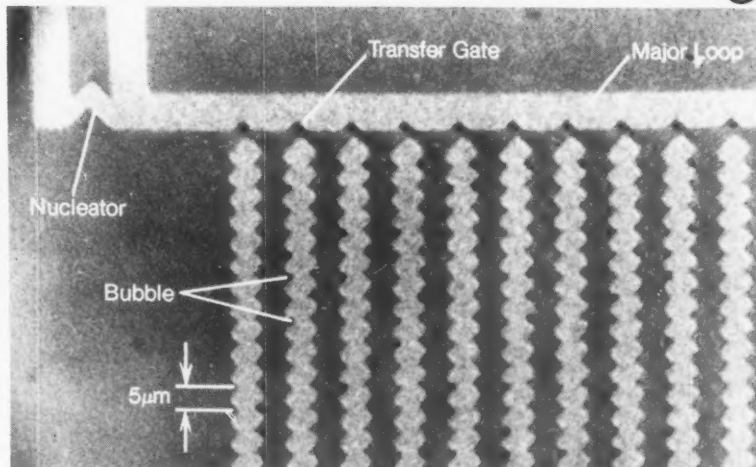
INDIAN WELLS, Calif. — Major advances in bubble memory and bubble technology — from increases in density and speed to greater reliability in manufacturing — are moving bubbles a step closer to practical, cost-effective use with computers, according to papers presented at the Third International Conference on Magnetic Bubbles here recently.

Research at IBM's San Jose Research Laboratory has resulted in a fully operational, experimental device capable of storing 15,000 bubbles at a density of 3.3 million bubble/sq cm, according to Dr. Ta-Lin Hsu, who led the effort. That is four times the density that can be achieved when bubbles of the same size are used in such devices now commercially available, an IBM spokesman stated.

Both Hsu's work and other bubble memory research under way at IBM is "strictly experimental, strictly in the research stage," he emphasized. Citing IBM policy on practical applications of research developments, he declined to speculate on any possible implication of the achievements, for computer users or design.

## Two Factors

Two factors account for the density increase achieved by the research group, Hsu explained: the use of special encoding and



This microphotograph shows a portion of one "contiguous disk" test device discussed by IBM scientists recently. Bubbles formed at the nucleator move along the major loop to one of the transfer gates, where they are moved for storage into the contiguous disk pattern area (sawtooth-shaped pathways). The data carried by the bubbles is read in the major loop.

decoding stations that permit intermixing of two different types of bubbles and a 60% reduction in both the height and width of the microcircuit pattern that guides the bubbles.

The device perfected by Hsu and his colleagues works with two different types of

(Continued on Page 50)



IBM scientists Dr. Yeong S. Lin (standing) and George E. Keefe work on a fully functioning memory device with bubbles smaller than any announced previously by the electronics industry.

## Micr-Encoded Coupons Hasten Vendor, Attendee Follow-Ups

Special to CW

NEW YORK — People who attend computer trade shows have become acclimated to the latest in hardware and software, but also to a less than up-to-date system for obtaining additional information. However, a system introduced here at the New York stop of Computer Expo '79 may help to change that situation.

The latest way for attendees to obtain follow-up information from vendors — and for vendors to obtain listings of attendees — is with magnetic ink character recognition (Micr) encoded coupons. Attendees, who get the coupons when they register, give them to the vendors from whom they wish to hear.

The idea for the system came from The Conference Co., organizers of the traveling exposition. After establishing criteria for the system, in early fall 1978, the company asked exhibitors to submit proposals to satisfy these functions.

- Create a master file of registrants in each city based on CRT input and editing.
- Summarize attendee interest for each individual exhibit.
- Provide information on company name, size and so forth (broken down by exhibitors) to interested attendees.

"We were confident that the system we wanted could be developed within the pa-

(Continued on Page 50)

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SYSTEMS & PERIPHERALS



## Upgrading Not a 'Canned' Process

# Del Monte Management Preserves Resources

By Jeffrey Beeler

CW West Coast Bureau

SAN FRANCISCO — Justifying the acquisition of equipment is seldom easy for any corporate decision-maker, but for DPs the problem can prove especially vexing, according to Fenwick Holmes, Del Monte Corp.'s DP manager.

Holmes, who speaks from personal experience, attributes the difficulty of cost-justifying new DP hardware to the rapid pace of technological innovation in the computer industry.

When someone suggests allocating funds for the purchase of noncomputer hardware — a piece of production

machinery for example — company managers tend to react favorably to the recommendation. They expect the proposed equipment of last 25 to 30 years — long enough to justify its high initial cost.

### Different Picture

But with computer equipment, the picture is usually quite different. When a company acquires a mainframe, it knows it will probably have to replace the system in just a few years — despite the high price — or face sure technological obsolescence.

As a result, DP managers like Holmes usually have great difficulty convinc-

ing management that a piece of DP hardware will boost corporate productivity enough during its brief life span to warrant its staggering installation costs.

Holmes isn't complaining about management's reluctance to invest capital in computer systems. "That's the way it should be," he stressed. "After all, companies aren't financing hobbies; they're financing businesses."

On the other hand, management's attitude toward computer acquisitions complicates his efforts to keep Del Monte's central DP site at an acceptable level of technological sophistication.

### Uses 370/158

The food distributing firm currently uses a 2M-byte IBM 370/158 that runs both day and night under SVS.

During the day, Del Monte reserves the system primarily for high-priority jobs like in-house time-sharing, program development and remote job entry, which permits the company to do payroll and general accounting for its various operating divisions.

At night, the system operates in a batch mode to perform standard accounting functions such as invoicing, general ledger, accounts receivable, order entry, stock control and sales accounting. At the end of regular business hours, the system updates its files to ensure the company's data is never more than 24 hours out-of-date.

"Our system isn't strictly a real-time system," Holmes explained. "I guess you could call it a realistic-time or 'current time' system. It operates a lot like a bank's computer, which updates accounts in batch mode at the end of each business day."

Attached to the 158 are six 3350 disk drives, eight 3330s, 11 Model 3420 tape units, a 1,100 line/min 1403 printer, an 18,000 line/min 3800 printer and 25 CRT terminals of mixed origins.

### Upgrade Plans

At an unspecified time in the future, however, Del Monte intends to upgrade its current hardware configuration by off-loading its time-sharing application onto a small processor, expanding the 370/158 to accommodate MVS or replacing the existing mainframe altogether with a 3031 CPU, the DP manager said.

As the company's upgrade plans suggest, Holmes has little interest in acquiring the newest hardware like IBM's recently announced 4300 series systems. But he does periodically seek to upgrade his company's system to the next highest "level of function" when he feels such an improvement is warranted.

How does Holmes convince his superiors to accept a proposed upgrade? "With great difficulty. It's a damn hard thing to do," he admitted, without elaborating on his methods of persuasion.

Holmes credits his company's management with displaying a "relatively sophisticated and advanced" attitude toward DP. "Our company views computers as a finite resource to be allocated and monitored just like capital or any other corporate resource, and management makes sure our DP department doesn't do anything that

doesn't have good cost-benefit justifications," he said.

As a service organization, Holmes' department rarely initiates DP projects or helps to formulate broad corporate policy. But because almost all commercial activities at Del Monte depend on computers to some extent, the DP manager and his staff play a key role in deciding how management's policies will be executed.

"There are few procedural decisions that can be made without involving the information services department," Holmes explained.

### Implementing Applications

To implement an on-line application, the DP department works closely with the prospective user department through Del Monte's information services committee, whose members include some of the firm's highest ranking executives. After the DP and user departments jointly define a proposed application, Holmes estimates the job's costs, and a user representative predicts the application's major corporate benefits.

After the participating parties implement the application, the information services committee conducts a review in which Holmes compares estimated and observed costs and the user department enumerates the job's benefits.

Thanks to this "salutary approach" to applications control, Holmes said, Del Monte's DP department never becomes involved in justifying the cost of a proposed project, nor is the department ever held accountable for a user's results.

## Graphics Forum Set for May

SILVER SPRING, Md. — The "Confluence of Technologies" will be the theme of the 28th annual conference and exposition of the National Micrographic Association (NMA), to be held in Atlanta May 8-11.

A series of NMA Institute seminars, to be held immediately prior to the conference May 7, will discuss several topics related to micrographics including computer output microfilm (COM), micrographic retrieval systems and micrographic systems design.

Common interest applications sessions at the conference will deal with the following industries: banking and finance, utilities, state and local government, industrial manufacturing, libraries and others. In addition, concurrent sessions will be devoted to subjects such as equipment selection criteria, COM software, the legality of microfilm and the relationships between COM and nonimpact printing.

For the first time, floor exhibits will include some nonmicrographic hardware, a spokesman said.

Registration for each of the seven seminars preceding the conference ranges from \$120 to \$150 for nonmembers of NMA and \$95 to \$125 for members. Registration for the conference itself is \$175 and includes an individual membership in NMA.

NMA is at 8728 Colesville Road, Silver Spring, Md. 20910.

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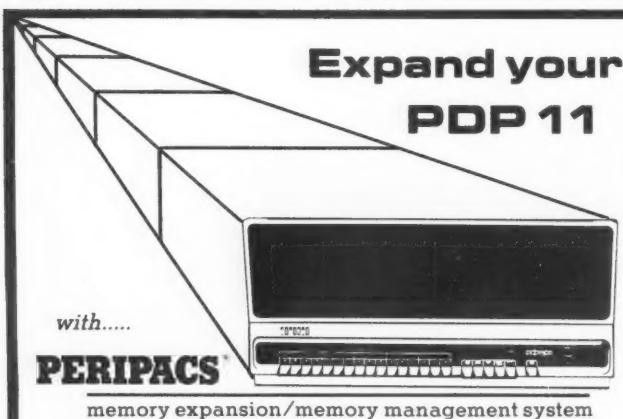
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# With Ink-Jet, Laser Technology Printer Advances Seen Changing Future Office

By Howard A. Karten

CW Staff

SAN JOSE, Calif. — If CPU design and capacity is the hare of the computer industry, printer design must be the tortoise; the former races forward almost yearly, while the latter makes steady though hardly dramatic progress.

Although the speed of printers has picked up somewhat, the limiting factor is still mechanical technology. Printers are slow, produce heat and are subject to problems such as friction and wear.

But all this is expected to change by 1985, when as much as 70% of the printers shipped will be based on other

technologies, notably ink-jet and laser-xerographic technology, according to a study published recently by SBS Publishing called "Printers for the Office of the Future."

## Impetus for Change

The driving force behind this change will not be the fast-growing field of word processing, but rather the rise of electronic mail and its associated networks, according to the study. It predicted that "the most important trend in the 1980's that will affect printers will be the increased intelligence of networks, terminals and printers coupled with massive, easy-to-use data base and electronic file systems."

At the same time the technology changes, the characteristics and functions of printers should change. "Multifunction units will dominate, with functions related to communications, paper handling, print quality, alphanumeric and graphics capabilities and speed," the report noted.

Changes will include restricted I/O flexibility, the use of intelligent printer/copiers with "substantial local capabilities" and the attachment of dumb printers to more powerful terminals. Among the local capabilities will be buffering and font storage, automated paper selection and handling and graphics and fax programs, the report predicted.

Several factors in addition to increased network growth will make important contributions to these developments, the report stated. Among these are economics, human and technological factors, which the report labeled "unpredictable but dramatic."

## Mail Service Becoming Unacceptable

Costs for certain standard components of an office environment — in particular, labor and mail costs — tend to rise over time. By 1985, the cost of a first-class letter is expected to be in the range of 25- to 50 cents, with clerical salaries expected to double.

"Management problems, compounded by ineffective cost control methods and ever-degrading service, will combine to reduce the mail service to an unacceptable method of business communications," the report predicted.

Offsetting this will be a decrease in digital communications costs, which the report said will approach 10% of current cost levels by the mid-1980s.

Human factors will also contribute to growth, but in an oblique way. More reasonably priced communications abilities such as hardware and line costs will help satisfy deepening desires for closer involvement with work and for less assembly line-like operations, the report indicated.

The familiar pattern of dropping costs and rising capacities will allow for more local ability, the report noted. (Indeed, easy-to-use, low-cost systems such as IBM's 6670 [CW, Feb. 19], are beginning to appear in increasing numbers.) "Dual floppy and 'bloppy' (bubble plus floppy disk) memory will be common to many terminal and copier printers," the report noted.

The rosy future painted for these emerging technologies will not mean that mechanical printers will be left in the dust. The use of exotic materials, composites and microprocessors will contribute to cost/performance improvements in the "slower" printers. "Executive-quality character printers at speeds around 90 char./sec are possible in one to four years. . . . One expected breakthrough is a 200- to 300-char./sec executive/correspondence-quality printer from General Electric Co.," the report predicted.

"Printers for the Office of the Future" is available for \$750 from SBS Publishing at Suite 215, 4320 Stevens Creek Blvd., San Jose, Calif. 95129.

## ICN to Hold Seminar On Lease Negotiation

WINTER PARK, Fla. — International Computer Negotiations, Inc. (ICN) will sponsor a three-day seminar here on third-party lease negotiations May 7-9.

Among the topics scheduled for discussion are potential problems that can arise in third-party negotiations, optimization of the financial aspects of a third-party, leased-equipment acquisition, creation of a proper balance between price and protection and strategies for the negotiation of leases, a spokeswoman said.

Registration for the seminar, to be held at the Langford Resort Hotel, is \$595. ICN is at 1331 Palmetto Ave., Winter Park, Fla. 32789.

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## Outputs 16,000 Vector/Sec

## Color Graphics Display System Unveiled

SUNNYVALE, Calif. — A high-performance, high-resolution raster-scan color graphics display system recently introduced by Ramtek Corp. can write vectors at a rate of more than 16,000 vector/sec, according to the company.

The Ramtek RM-9400 display generator, available in six resolutions, was designed to be used with a mainframe or minicomputer and reportedly removes much of the processing load from the host. The microprocessor-based hardware can be used for multi-spectral imaging applications such as remote sensing and graphics, mapping, process control and sophisticated research programs, the firm said.

The smallest unit in the family, the Model RM-9400/4X, provides resolution of 512 lines at 512 element/line; the largest, the RM-9400/9X, gives resolution of 1,024 lines of 1,280 elements (pixels) each. Refresh frequency on the units is either 50/60 Hz or 25/30 Hz, ensuring a flicker-free display, according to the company.

## Hardware Features

Hardware features on the units include scaling and hardware zoom and panning. Optional hardware includes pseudocolor and gray-scale translation/enhancement of stored pictures.

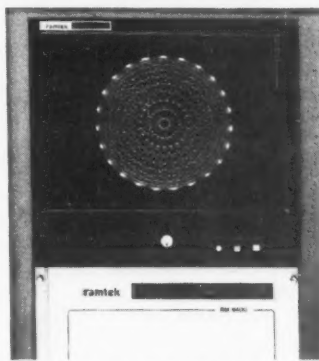
The standard font for the series contains 128 symbols, defined with a 7 by

9 dot matrix. Up to 15 additional fonts can be down-line loaded, and maximum font resolution is 16 by 20 elements. Symbols can be magnified by pixel replication, a spokesman noted.

The system is said to be capable of single or multichannel operation and can be configured as an output peripheral or as an on-line interactive display system.

A minimum configuration for the hardware costs \$35,000; a typical system, including a monitor, costs approximately \$50,000 to \$60,000, depending on the interface and the number of channels, keyboards and refresh planes.

Ramtek is at 585 N. Mary, Sunnyvale, Calif. 94086.



The Ramtek RM-9400 Display Generator.

## AUUA Meet Set for May

MINNEAPOLIS — "Expanding Needs/Creative Answers" will be the theme of the annual spring conference of the Americas Univac Users Association (AUUA) to be held here May 6-10.

The five-day meeting will feature John W. Demidovich, a professor of computer systems analysis at the Air Force Institute of Technology at Wright-Patterson AFB in Ohio, and Dr. George A. Champine, director of Advanced Systems at Univac.

Registration for the conference is \$90 in advance or \$100 on-site. AUUA can be reached through P.O. Box 462, York, Pa. 17405.

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## Climate-Adapting Paper For Printers Debuts

SECAUCUS, N.J. — A dielectric recording paper recently introduced by Matsushita Electric Industrial Co., Ltd. for use in printers and terminals gives high-quality results under the most extreme climatic conditions, according to a spokesman.

The paper, which reportedly extended the effective operating range of dielectric recording papers, is said to be functional in the range of 0% to 100% relative humidity. This makes it well-suited for use where computer terminals or other hard-copy output devices cannot be completely protected from the surrounding atmosphere.

The recorded image on the paper will not fade or discolor as a result of aging, a spokesman claimed.

A 20-in. by 328-ft roll of the paper costs between \$36 and \$39 per roll, depending on the quantity ordered, a spokesman said. Matsushita Electric is at One Panasonic Way, Secaucus, N.J. 07094.

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## Coupons Aid to Follow-Ups

(Continued from Page 45)  
rameters we outlined in our letter to exhibitors," according to David Dolber, sales director for The Conference Co. The Cummins-Allison Corp. group met and "exceeded our criteria," Dolber said.

### Card System Rejected

"The Micr coupon book with 20 encoded coupons came from Cummins. Initially, we considered a card system, but after reviewing our ideas with Cummins, we decided to use its suggestion," Dolber explained.

The Cummins Series 6400 Distributed Processing System consists of a 128K-byte CPU, a 9-track tape drive, two 9.8M-byte disk drives, 26 CRTs and a six-pocket Micro

reader/sorter.

"In addition to vastly improving the time needed for show registration by both exhibitors and attendees, the system's Micr inquiry/coupon books offer attendees a simplified method for requesting further information from exhibitors," he said.

### From Visitor to Vendor

As visitors enter the registration area, they are asked to complete an information form. The completed form is then given to one of the 26 CRT operators, who key in all information and give the visitor the 20-coupon book. The end result of this process is the visitor's computer-printed identification badge.

Caravan attendees then use

the self-identifying coupons at any of the exhibit booths when they want additional information or a follow-up sales call. At the end of each day's show, exhibitors leave these coupons at the registration center, where they are processed on the reader/sorter.

Exhibitors then receive a hard-copy report with all the relevant information, as well as the input documents.

"Reaction to the system has been most gratifying," Dolber remarked. "The traditional long lines at the registration center were practically nonexistent [in New York], and we heard many favorable comments from attendees who found the coupons easier for requesting more information."

## Research Brings Bubble Advances

(Continued from Page 45)  
bubbles, both 2.7 micrometers in diameter, traveling between permalloy chevron-shaped elements 1.4 micrometers apart. Conventional optical lithography techniques can be used at this distance, the spokesman noted.

Conventional bubble memories have only one type of bubble, and its presence or absence makes up the familiar binary-valued information storage technique. However, magnetic forces cause the bubbles to stay four or five diameters from each other. If pushed closer together, the bubbles can force each other into gaps in the bubble array and destroy information.

### Allows Denser Packing

To pack more information into the same amount of space, Hsu's research group introduced two different types of bubbles and special encoding and decoding stations on the chip. With distinguishable bubbles, it is practical to store the bubbles as much as two diameters apart, quadrupling the density.

Halving the height and the width of the microcircuit pattern's elements on the chip surface helped to increase the density. This means four times as many bubbles can fit into the same area.

However, the gap separating the chevron-shaped guides remains the same width so the same fabrication processes used in conventional manufacturing can be employed.

Other members of Hsu's research team were Byron Brown, Alain Desouches, David Hannon, C.Y. Liu, Donald Saiki, Robert Burn and Walter Weresin.

In another research development, bubbles were reduced to one micrometer in diameter, as opposed to the conventionally designed two and three-micrometer bubble devices.

Bubbles this size can store four million bit/sq cm, a spokesman for IBM's Watson Research Center in Yorktown Heights explained.

### Circuits, Fabrication Methods

Two additional aspects of the work in Yorktown Heights were termed significant by the IBM spokesman. These are a new way of manipulating bubble movement, using circuits in which the bubbles travel along pattern edges and fabrication methods, requiring fewer steps than needed for conventional, commercial devices.

The bubble-guiding method is called "contiguous disk" and differs from conventional devices in which the bubbles must overlap the circuit pattern. The force guiding the bubbles comes from magnetic interactions between the bubbles and the pattern edge.

"Conventional bubble de-

vices presently being produced have potential use in terminals, communications devices and small computers, but to replace large mechanical storage devices like tapes and disks, it's essential to get the smallest possible cost per bit," according to Dr. Emerson Pugh, manager of exploratory magnetics at the research center.

### High Density Needed

"For that type of application, very high densities will be required, such as the densities we have achieved with the one-micrometer diameter bubbles."

Preliminary experiments conducted by IBM's Yorktown Heights scientists indicated that manufacturing techniques for making one-micrometer bubble devices could be scaled down successfully to bubbles half that size, an IBM spokesman claimed.

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# General-Purpose, Array-Processing Eclipse S/250 Gains Satellite Processors

WESTBORO, Mass. — Data General Corp. has announced general-purpose and array-processing models of satellite processors as high-performance options for its Eclipse S/250 system.

The Model 8660 and 8661 satellite processors can each function as a front-end or independent processor to significantly offload the host CPU, DG said. Each unit includes two circuit boards with independent processor logic, memory and I/O buses and implements the standard Eclipse instruction set.

The Model 8660 general-purpose satellite processor includes 64K bytes of parity MOS memory with memory allocation and protection (MAP) capability. Also featured are a microprogrammed processor, an independent, S/250-compatible I/O bus; a software-controlled console; and an inter-

face for high-speed bidirectional data transfers with the S/250.

The 8660 instruction set consists of the basic Eclipse instruction set as well as the Eclipse character set, which facilitates bit, byte and data string manipulation and translation, DG stated.

The Model 8661 array-processing satellite processor includes 56K bytes of parity MOS memory with MAP as well as 8K bytes of bipolar array processing memory. This model augments the basic Eclipse instruction set with array processing commands that are common to the Eclipse AP/130 and the Integral Array Processor (IAP) option for the S/250, DG said.

Both satellite processors support a cross-interrupt facility to synchronize satellite and

central processor operations, the vendor noted. With the MAP software control feature, the user can direct memory reference instructions in the satellite processor program to local satellite processor memory or to the host S/250 main memory.

The same facility exists for data channel direct memory address (DMA) references from devices on the satellite processor's private I/O bus. This not only permits high-speed interprocessor data transfer, but enables data sharing and routing, DG explained.

Tasks running under the S/250's Real-Time Disk Operating System (RDOS) can bidirectionally communicate and transfer data with corresponding tasks running under the Real-Time Operating System (RTOS) in the satellite processor, the vendor added.

Programs can be written in global optimizing Fortran V, DG/L or assembler and can manage and move data buffers transparently between tasks via simple subroutine calls to the satellite processor software interface library, DG said.

Further, tasks running in either satellite processor can implement the data movement functions supported by RTOS in addition to language, operating system and communications utilities. Model 8661 tasks can also implement the Array Processor Software library.

## 'Broad Applicability'

"The applicability of S/250 satellite processor systems is broad and varied," a DG spokesman claimed. "For example, the 8660 can be used as a communications line concentrator to handle interrupts, error messages and unique line protocols while the S/250 performs message-switching functions."

The 8660 "can be a front-end processor for sensor I/O — preprocessing data before forwarding it to the host for numbercrunching, or as a real-time analog-to-digital front-end processor or a back-end graphics processor," he added.

The Model 8661 "has direct application for image-processing environments where each [unit] stores the array-processing load as a back-end processor to the S/250 host," the spokesman continued. "It could operate as an independent front-end processor that re-

(Continued on Page 56)

# Tektronix Introduces Family Of Desktop Systems Combining Processing, Interactive Graphics

BEAVERTON, Ore. — A pair of desktop graphics computer systems have been announced by Tektronix, Inc. to form, with a previously announced system, a family of three 16-bit, software-compatible graphics processors.

"The three products will satisfy a broad range of user requirements from low-cost graphics systems to high-performance computing and high-density, interactive graphics. [They] will be particularly strong in the areas of research, engineering design and management reporting," a spokesman maintained.

Tektronix's 4050 series of graphics systems features a version of Basic that is oriented to detailed, high-resolution CRT representations, the vendor said. The previously announced Model 4051 and just-released Model 4052 feature 11-in. direct view storage tubes (DVST), while the new Model 4054 offers a 19-in. DVST with more than 13 million addressable points.

The Model 4054 is the only desktop computer that can support 133 character lines of text and allow the user to preview full pages of computer printout at a glance, Tektronix claimed.

## Hard Copy on Demand

All members of the 4050 series create on demand hard copy of graphics and/or alphanumeric shown on the screen, the vendor continued. All Plot 50 software can be used with any of the systems, allowing system expandability to multiuser configurations.

Plot 50 packages include the Mathematics Program Library, General Utility Programs, Business Planning and Analysis, Statistics Program Library, Electrical Engineering Program Library and Graph Plot. The latest module in this Tektronix library is a management-oriented decision-making aid called the Modeling and Reporting Software Package.

Each Tektronix 4050 features an internal magnetic tape drive with 300K bytes of storage for data and program storage and a general-purpose interface bus (CPIB) that conforms to the GPIB standard of the Institute of Electrical and Electronics Engineers.

Depending on program content, processor speed-up and microcoded floating-point instructions allow the 4052 or 4054 to execute programs four to 40 times faster than possi-

ble with the 4051, Tektronix stated. But "average" programs are generally run from seven to 10 times faster, the spokesman added.

The 16-bit micro in the 4052 and 4054 also executes instructions added to facilitate fast, accurate (14-digit) floating-point arithmetic, he stated. This enhanced computational performance reportedly reduces the time spent by users to update displays, allowing more time for interactive DP, including analysis and modeling.

The 4052 and 4054 can handle transcendental — such as exponentials and trigonometrics — up to 30 times faster than the 4051 because of their operating system's floating-point capability, Tektronix said. The desktop units can optionally attain data communications speeds as fast as 9,600 bit/sec.

Standard memory for the 4052 and 4054 is 32K bytes; top capacity is 56K bytes. Both models come with binary loading and matrix commands.

While the 4051 and 4052 feature dot matrix character generators, the 4054 offers four user-selectable character sizes and

(Continued on Page 56)



## Soft Touch

A soft touch on a terminal keyboard menu, connected to a minicomputer, helps the Carl's Junior fast food chain control food inventory and speed up order handling. See story on Page 56.

MINIWORKS



## Small Business System Geared Toward OEMs

ST. PAUL, Minn. — The first member of a family of small business computers, aimed at OEMs and system houses, has been introduced by Astrocom Corp.

The Series 760 is built around a Zilog Z80 microprocessor-based tabletop keyboard/display terminal that includes read-only memory (ROM) and variable increments of random-access memory (RAM), according to a company spokesman.

The 88-key detachable keyboard features a numeric cluster, cursor-positioning controls and function keys.

The unit's disk drive subsystem contains one or two dual-density, flexible-disk drives, a power supply and a microprocessor-based controller with a parallel interface to the keyboard display unit, the spokesman explained.

An optional matrix printer employs a print-wire impact system at a bidirectional speed of 180 char./sec.

The system is user-programmable with the firm's language or the business-oriented version of the Basic language. The forms language is an operator-oriented language.

Control programs provided with the Series 760 include a system executive, drivers for the peripheral devices, a data set manager and system utility routines.

Inquiry/response and record retrieval and update are possible with the system. An optional communications package provides for information transfer with a host processor

at rates of up to 9,600 bit/sec.

The cost of the system varies from about \$9,000 to \$15,000. A single unit with 1M byte of floppy disk storage, a 180 char./sec matrix printer, 64K bytes of memory and a workstation costs "a touch under" \$15,000, according to the spokesman.

Astrocom is at 120 W. Plato Blvd., St. Paul, Minn. 55107.

## 'Gemini' Floppy Disk System Debuts

HARTFORD, Wis. — A floppy disk computer system has been added to the Constellation microsystem series of General Robotics Corp.

The Gemini system is packaged with a Digital Equipment Corp. LSI-11 CPU, 60K bytes of random-access memory, a serial I/O port, two double-sided, double-density floppy disk drives and the RT-11 operating system.

Costing less than the DEC RX02 floppy disk systems, the Gemini system has twice the performance, General Robotics claimed. The product is said to provide more than

2.5M bytes of disk storage compared with just 1M byte on DEC's offerings.

The Gemini also has Qbus expansion space for nine additional LSI-11 modules. The system's serial asynchronous I/O module reportedly supplies an RS-232C or 20mA interface capable of operation in the 50- to 19.2K bit/sec range.

Transmission speed and universal asynchronous receiver transmitter (Uart) parameters are switch or program-selectable.

The Gemini system costs \$9,000, or \$6,750 in quantities of 20. General Robotics is at 57 N. Main St., Hartford, Wis. 53027.

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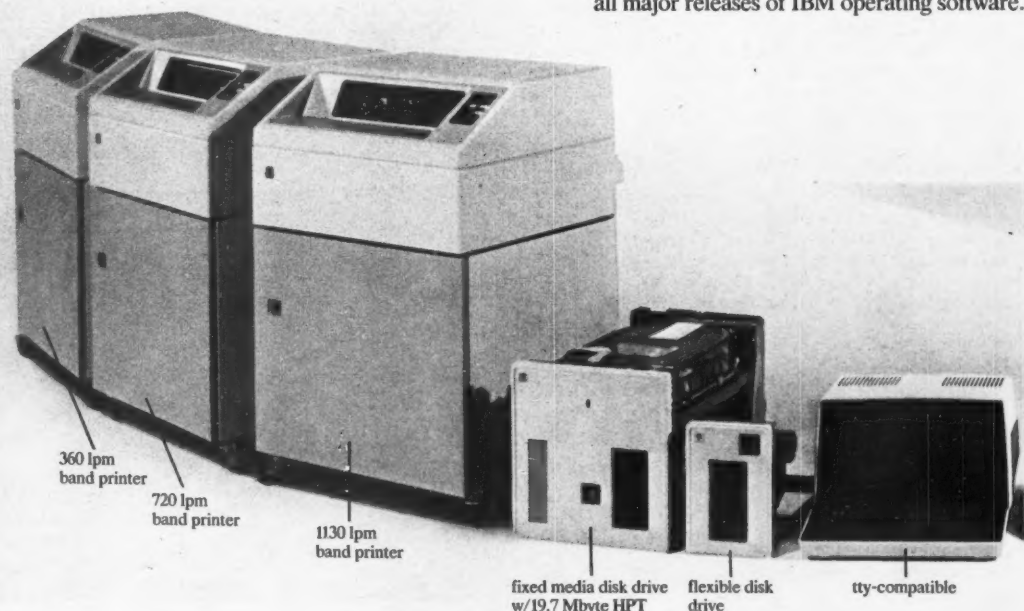
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## Printers Offered For HP Minis

FORT LAUDERDALE, Fla. — Plug-compatible printers for Hewlett-Packard Co.'s 3000 series minicomputers have been added to the Southern Systems, Inc. (SSI) printer line.

SSI's H-2200 printer family features speeds in the 200- to 900-line/min range, and models cost from \$5,000 to \$16,000.

Deliveries are under way, the vendor said from 3000 N.E. 30th Place, Fort Lauderdale, Fla. 33306.



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## At Loading Stations

# Oil Supplier's Mini Net Discourages Fire, Theft

By Brad Schultz  
CW Staff

CHICAGO — A major supplier of oil products has reportedly lessened the risk of oil truck hijackings and loading fires and explosions at 52 bulk terminals by installing a distributed network of mini-computers.

Amoco — also known as Standard Oil Co. of Indiana —

has adopted the Terminal Automation System (TAS) developed by its Chicago-based subsidiary, Amoco Computer Services Co. (ACSC). All 80 of Amoco's bulk terminals — where tank trucks fill up for deliveries to service stations, homes and businesses — will be on-line with TAS by the end of 1979, according to Richard W. Munkelwitz,

ACSC product manager.

TAS includes an IBM Series/1 Model 3 or 5 CPU with 64K-byte main memory and special-purpose software written in IBM's EDX by ACSC. The firm plans to market the integrated system to other petroleum suppliers and may develop similar systems for suppliers of other commodities transported by tank

trucks, Munkelwitz said.

### Visit Control

TAS controls the tank truck's entire visit at a bulk terminal. The front gate does not swing open to admit the truck unless TAS has first verified the driver's identity and granted permission to approach a "load rack" beside one of the terminal's huge

storage tanks.

"After pulling his truck up to one of the load spots at the load rack, the driver must use two magnetically encoded cards to validate the withdrawal transaction," Munkelwitz said. "First, he inserts his personal identification card and the system checks to see that both driver and carrier are authorized."

"Next, the driver inserts his customer identification card, which indicates who the load is for and the product type — such as gasoline, distillate, re-brand or blend. The system checks the customer's credit and whether the product to be drawn is authorized for that customer."

### Avoiding Explosions

Unless the truck is electrically grounded prior to loading, sparks can result from friction as liquid rushes from the tank to the truck through a connecting tube. TAS does not permit loading to begin until the driver has plugged his vehicle to the earth; a few sparks near exposed petroleum could set off a major explosion or fire, Munkelwitz explained.

TAS precisely measures the quantity of petroleum sent to the truck, he continued. Since fluid expands when heated, the outside air temperature during loading as well as the rate of flow must be noted. Otherwise, the customer might receive less than the volume charged for on a hot day; on cold days, Amoco might undercharge.

TAS allows for minute temperature fluctuations during loading by reading the air's temperature each time 200 gallons flow to the truck. "The system also makes a range check on the temperature signal to make sure it is valid — and the range check values can be changed from season to season," Munkelwitz added.

"The system will also make certain that a driver does not delay too long in drawing his load after the green light has been given. If a specified period of time passes and the driver still has not begun to load, the system 'times out' the driver and gives him a red

(Continued on Page 55)

## line of miniperipherals even more attractive."

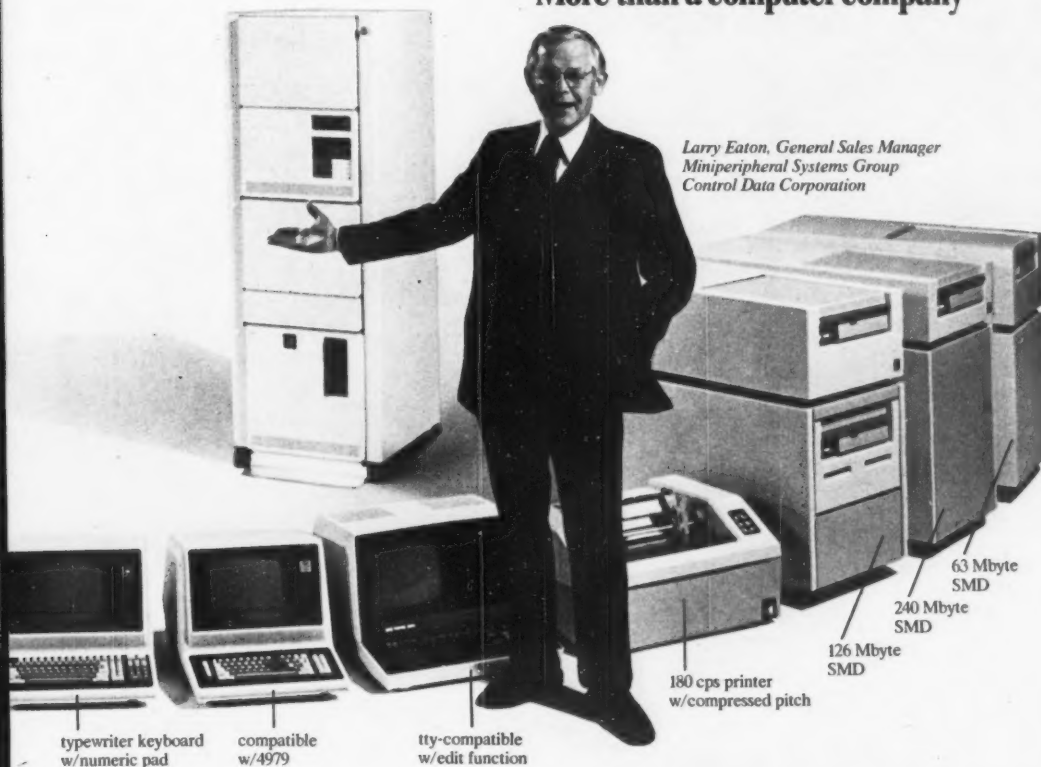
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## Portable System Features Modem, Acoustic Coupler

MINNEAPOLIS — A complete computer system with up to 1M bytes of random-access memory (RAM) and a 300- or 1,200 bit/sec modem with built-in acoustic coupler is available in a carrying case from Micro Application Systems, Inc. (MAS).

## Mini Net Stops Oil Theft, Fire

(Continued from Page 53)

light. He must then repeat the badge entry sequence if he wants to draw product."

The "time out" feature prevents a driver from leaving a load in a "green" condition so that product could be drawn by someone else. The measure also discourages loitering.

Security is the foremost responsibility of TAS. "Effective security is not that easy to maintain with the constant comings and goings of the tank trucks," Munkelwitz observed. The most important security problem is possible theft or fraudulent pickups.

The incentive for tank truck hijackings is soaring with the cost of oil. Moreover, diminishing reserves of domestic oil and further increases in oil import tariffs worsen the impact of thefts and losses from fires and explosions.

Such incidents aggravate consumer shortages and make it more difficult, if not impossible, for some consumers to afford petroleum products, Munkelwitz pointed out.

Amoco is also alarmed about the potential for sabotage, he indicated. The recent terrorist bombing of a Mobil Oil Co. facility has reportedly been a factor in the company's decision to bolster bulk terminal security.

TAS automatically produces a bill of lading for the driver that is ready at a special hut by the time he can walk there from the load rack, Munkelwitz said. This document indicates the product dispensed, the amount drawn, the date and time of pickup, the final destination of the product and any special delivery instructions. "Each bill of lading is serially numbered to provide a clear audit trail.

The ACSC software allows each bulk terminal's TAS to communicate with a host IBM 370 at Amoco headquarters. The mainframe can dial any Series/1 in the network to pull in transaction data for billing purposes and any other information that might be needed.

Munkelwitz said IBM was selected to supply the processor for TAS because only that vendor seemed to offer the range of hardware and support his firm required.

The Mascot computer system includes an 8-bit or 16-bit microprocessor and a 5-in. 7 by 9 dot matrix CRT that displays all 128 characters of the Ascii set. Also featured are single or dual minifloppy disk drives offering 80K to 320K bytes of storage and a 40- or 80-column dot matrix printer.

Mascot firmware is extended Basic, featuring integrated assembly instructions accepted by a high-level incremental compiler, the vendor said. The operating system reportedly handles multidisk files.

The Mascot costs \$3,999 to \$9,999, depending on configuration. MAS is at 4345 Lyndale Ave. North, Minneapolis, Minn. 55412.

## Word Processor Built for TI Systems

RALEIGH, N.C. — A word processing system that can be used with Texas Instruments, Inc.'s (TI) models 771, 774, and DS990 computers is available from Business Application Systems, Inc. (BAS).

The Text Formatter, in collaboration with TI's Text Editor, reportedly prepares reports, correspondence, financial statements and materials for publication at "rough draft typing speed."

The system provides such word processing capabilities as justified margins, proportional spacing, boldfacing, horizontal centering and automatic inclusion of standard text materials.

The Text Formatter uses "easily remembered" commands. "Almost no training is required for an operator already familiar with a TI Text Editor," a spokesman claimed.

The unit includes a Qume Sprint 5 daisy wheel printer with a variety of typefaces. The unit prints at 10- or 12-char./in. or spaces proportionally, depending on the typewheel.

The Text Formatter, including the printer, controller, cables and software on diskettes or 1,600 bit/in. tape, costs \$4,500. The software is available on other media at additional cost.

BAS is at 7334 Chapel Hill Road, Raleigh, N.C. 27607.

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## Installed by Fast Food Chain

# Hungry? System Orders Food 37 Seconds Faster

By Marguerite Zientara  
CW Staff

ANAHEIM, Calif. — A statewide fast food restaurant chain is processing orders 37 seconds faster than it did mechanically, thanks to a mini-computer-based control and communications system.

Carl's Junior fast food chain, headquartered here, has installed the Star systems supplied by HLX Systems of Anaheim in 170 of its 250 restaurants throughout California.

The system allows each order for food to be automatically transmitted from the cashier's terminal to the cook's printer in the kitchen, eliminating the need for hand-writing orders or hand-carrying those orders to the kitchen.

With each store selling about 1,000 hamburgers, 700 orders of French fries and 1,500 soft drinks to about 800 customers every day, the time saved means more customers served, fewer cashiers needed at the stations and more personnel in the kitchen, according to Ron Paullins, district manager at Carl's Junior.

"When a customer places an

order at the counter, a cashier touches the appropriate boxes on an HLX systems terminal keyboard containing all the menu items, cooking instructions, 'dining room' or 'carry out' keys and miscellaneous reporting keys.

"The terminal totals the sale and adds tax," he continued.

Depositing the money in the cash drawer triggers an alert to a 32K-byte Model DC-3 HLX processor, usually located under the cashier's counter, indicating any orders that need to be printed for the cook.

If the processor determines that an order needs to go to the cook, it is immediately printed out on a Landis & Gyr 1.6 line/sec, 15-char.-wide impact printer in the kitchen.

While mechanical cash registers took at least one minute to process each order, which then had to be carried by the cashier to the front of the kitchen, the mini-based ordering system takes "only 23 seconds, which means we can handle even more customers," Paullins said.

### Other Uses

Besides speeding up the or-

dering process, the system helps management in such areas as inventory control, accounting and labor monitoring functions.

Data is used by the individual stores and central headquarters for analysis of food waste and shortage, production cost, profit analysis and employee salaries.

"Before we got the system," Paullins noted, "all of the planning for ordering supplies was done by hand. Each store manager had to take all of the approximately 5,500 guest checks for a given week, add up the number of items sold and match it against the week's inventory to calculate food waste and shortage."

The estimates made using that method were "hit or miss," Paullins recalled. Each manager orders at least 2,000 pounds of hamburger per week. "If figures were wrong, that would mean a lot of wasted food," he said.

"Now, each time a cashier enters a sale, it automatically enters the computer, where it is stored on a 256K-byte Wangco, Inc. Model 82 disk drive," Paullins said.

Since the system is programmed with the latest costs for every needed commodity — onion, relish, lettuce, hamburger patties and buns, — it can also figure the price per hamburger as well as for all other items on the menu to determine production costs and profit margins.

"By entering a code number, store managers can receive additional sales data including the number of over-rings, weekly sales, net sales, tax, number of discounted items, number of coupons cashed in, cash for the day and hourly cash readings," Paullins noted.

When there is a price change or additional program modifications, central headquarters mails new disks to the stores.

"All the local manager has to do is load them into the disk drive and he's ready to go in just a few seconds," he said.

Every morning, an IBM Series/1 minicomputer with 128K of memory, located at Carl's Junior headquarters, polls the stores' computers for sales and inventory statistics for later processing.

"Presently, each store has to call headquarters to order supplies," Paullins said. "But within a year or two, when we have expanded, headquarters will be able to determine the amount of hamburger, ketchup, French fries and buns that each store needs based on analysis of this data and will order all supplies for all outlets."

## Units Mix Graphics, DP

(Continued from Page 51)

draws dotted, dashed and solid vectors with an added character font for business and international markets, Tektronix continued.

To save drawing time, the 4054 contains a constant-rate vector generator instead of the constant-time vector generator in the 4051 and 4052. As a result, the time required to draw a vector is proportional to its length, the vendor explained; shorter vectors take less time to draw.

## Eclipse Gets Two Satellites

(Continued from Page 51)

ceives analog or digital information on its private I/O bus — forming array operations before transferring the results to the S/250 for further processing or filing."

Both satellite processors are contained in an eight-slot system module that includes processor, memory and internal cables. The 8660 module holds up to six I/O device controllers, while the 8661 module holds up to three I/O controllers.

Either unit can expand to support as many as 10 controllers with DG's Model 8652 eight-slot I/O system module.

Up to four satellite processors of any mix can be supported by an S/250, the vendor noted. The first two can mount in the S/250 cabinet and the remaining units in the Model 8651-A expansion cabinet; each satellite processor would use the dc power available in its respective enclosure.

The Model 8660 general-purpose satellite processor costs \$8,800; the Model 8661 array-processing SP is tagged at \$22,900. DG is at Rt. 9, Westboro, Mass. 01581.

Tektronix has introduced read-only memory (ROM) packs for the 4052 and 4054, including the 4052 RO6 editor, 4052 RO7 signal-processing ROM pack, Option 10 printer interface and the 4907 file manager.

The 4050 series is compatible with such Tektronix options and peripherals as the 4952 Option 2 joystick, the 4641 and 4642 matrix printers and the 4631 hard-copy unit.

The Model 4051 system remains priced at \$5,995; the 4052 costs \$9,800, while the top-of-the-line 4054 is tagged at \$16,500. Lease terms and discounts for quantity and OEM purchases are available.

Tektronix is located at P.O. Box 500, Beaverton, Oregon 97077.

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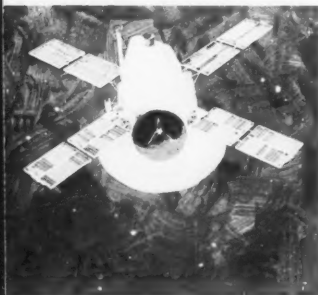


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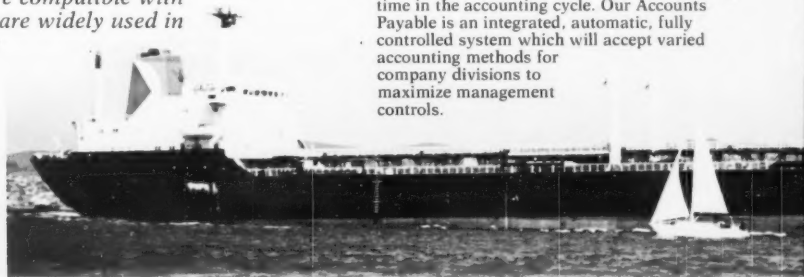
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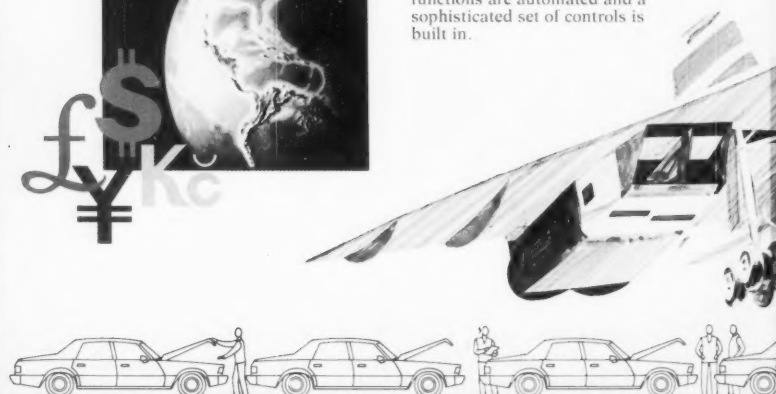
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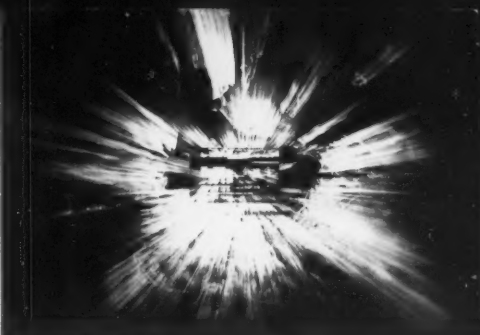


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Seventeen years ago, when two colleagues and I founded Informatics, we were armed with a handful of custom programming contracts from the government. In time, the needs of the industry changed and we changed with it. While continuing to serve our government clients, we began in the mid-sixties to market proprietary software products. We knew that companies must look at data processing in a businesslike way by continuing to challenge and test its cost-effectiveness. Software products represent the best way to substantially reduce programming costs.

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*Walter F. Bauer*

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## Opportunity Is Knocking

By Ann Dooley  
CW Staff

MEMPHIS, Tenn. — Self-employment opportunities in the microcomputer field are growing dramatically, and an increasing number of computer practitioners are stepping in to service the potential user market, according to a special report published here by Datasearch, Inc.

While some opportunities may be only part-time or sideline operations, the need for all microcomputing products and services will continue to grow, the report said.

The demand for such products and services is being created not simply by the hobby market but, more importantly, by the small business market and the still-untapped home market, where computers can be used for practical home applications or entertainment purposes.

Although hobbyists are most interested in the systems themselves, other users want custom-designed systems with soft-

ware tailored to their needs. But future growth will evolve primarily from packaged plug-in systems for small business and household use, the report noted. In addition, a large market of home users will open up. These users will purchase large numbers of "throwaway" software products such as games that will be used for a while and then discarded for newer or better versions.

### Software Sector Opportunities

Business opportunities for the personal computer entrepreneur can be found in the software sector, according to the report, which predicted that market development will be controlled by the availability of packaged software that doesn't depend on customization.

Software can be marketed either by an established software publisher or by the author himself. But most programmers have little knowledge of marketing or business and tend to ignore such consid-

erations, thereby damaging their chances of selling any software, the report said.

The micro software publisher functions much like a book publisher. The guide advised that the author check the publisher's reputation, however, since methods and abilities many vary significantly from one publisher to another.

The report also advised that the author thinking of publishing his work establish a relationship with the software publisher now before the publisher is deluged with business from other authors and the field becomes saturated. Publishers will be more likely to work with someone they already know, the report noted.

### Innovation a Must

Software publishing may prove rewarding for small entrepreneurs, but the small publisher must be innovative in order to compete with large-scale publishers entering the arena, Datasearch said. Adver-

(Continued on Page 62)

## Micro Chips

### Vector MZ Gets Linking Assembler

WESTLAKE VILLAGE, Calif. — A Z80 linking assembler for the Vector MZ microcomputer has been released by Vector Graphic, Inc.

Called ZSM, the assembler supports the full Z80 instruction set and utilizes a superset of the 8080 mnemonics. For additional flexibility, it also supports 17 pseudo-operations including "define text," "reserve storage" and "conditional assembly," a spokesman said.

The LINK pseudo-operation permits an almost infinite source program to be broken into small modules, he added.

Costing \$50 the ZSM package, including system diskette and user's manual, is available from all authorized Vector Graphic dealers. Vector Graphic is at 31364 Via Colinas, Westlake Village, Calif. 91361.

### Basic Interpreters Gain 16-Digit Precision

MORRISTOWN, N.J. — A 16-digit precision scientific subroutine package written for Microsoft, Inc. extended and disk Basic interpreters, including Radio Shack TRS-80 Level II Basic, is available from Miken Optical Co.

DPfun features 13 double-precision exponential, logarithmic, trigonometric and inverse trigonometric functions and provides a utility for engineering and scientific applications, according to the company.

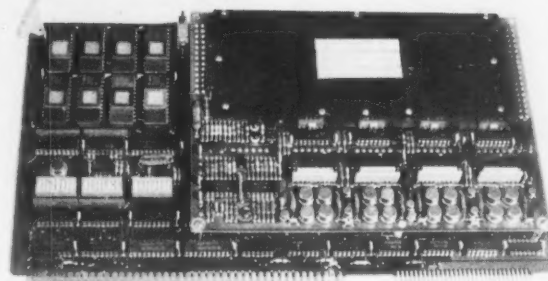
DPfun uses truncated continued fraction algorithms that result in easily entered code. The complete set of subroutines occupies approximately 2.5K bytes of memory. DPfun source code costs \$10 from Miken Optical Co., 53 Abbett Ave., Morristown, N.J. 07960.

## Memory Board Fits Intel Units

CHATSWORTH, Calif. — Designed specifically for nonvolatile storage with Intel Corp.'s Inteltec MDS and SBC 80/05, 80/10, 80/20 and 80/30 microcomputers, the MM-8080B from Micro Memory, Inc. features an 8K-byte core memory system and up to 16K bytes of read-only memory (ROM) using 2708 or 2716 memories on the same module.

The module is plug-compatible with Intel's Multibus and can directly replace the SBC-406, SBC-416 and SBC-016, the firm said. The MM-8080B can also be used with computers from other manufacturers that offer SBC-80-compatible products.

The memory has internal power monitoring circuits to protect data in core from power failure or during on/off conditions. No battery backup or special circuits



Micro Memory MM-8080B

are required for power supply sequencing.

Portions of the core memory may be write-protected in 1K increments up to 8K.

The MM-8080B provides a separate module selection switch for

both the 16K bytes of ROM/random-access memory and 8K bytes of core partition in 4K increments.

The module costs \$790 from Micro Memory at 9438 Irondale Ave., Chatsworth, Calif. 91311.

## S-100 Built for Industrial Users

SANTA CLARA, Calif. — Industrial Modules, Inc. has introduced an S-100 processor/console board with integral CPU and console functions designed to work in industrial environments.

The Inmod-885 features a 3 MHz 8085A CPU, an erasable programmable read-only memory (Eprom) monitor, 20-digit keyboard and 8-digit prompting hex display.

The prompting hex display reduces the chance of error in reading or entering data, and the clear hex console keyboard reduces the chance of conversion error in program entry, according to a spokesman.

The conversational monitor provides the usual I/O functions plus memory protect/unprotect and two debugging aids.

Another feature of the system is Multi-Step, which allows the user to define the number of instructions to be executed before control is returned to the moni-

tor. The instructions are executed in real-time so that even time-dependent loops can be debugged, the spokesman said.

This hardware-implemented function allows a user to define a breakpoint for any address combination — I/O, data or instruc-

tion. The number of breakpoint "hits" can be programmed before returning to monitor control, he said.

The Inmod-885 costs \$399 from Industrial Modules, P.O. Box 2985, Santa Clara, Calif. 95051.

## Memory Module for S-100 Offers Up to 512K Bytes

WESTLAKE VILLAGE, Calif. — The CI-S100 memory module introduced by Chrislin Industries, Inc. features dynamic random-access memory (RAM) and requires no wait states at 2- or 4 MHz.

The CI-S100 was designed to plug directly into the memory slots of most S-100 microcomputers.

Features include expandability to 512K bytes with a bank-selectable feature that allows users to select up to eight 64K-

byte memory cards. On-board hidden refresh requires no outside intervention, making the CI-S100 look like a static RAM, even during block direct memory access (DMA) write applications, a spokesman said.

Addressable in 4K-byte increments up to 512K bytes of memory, the memory module is available with battery backup capability. It costs \$695.

Chrislin Industries is at No. 102, 31312 Via Colinas, Westlake Village, Calif. 91361.

# Device Allows In-Circuit Testing of Z80 System

**YORKTOWN HEIGHTS, N.Y.** — The AQ8080Z microprocessor analyzer and clip-on probe from AQ Systems, Inc. permits in-circuit testing of Z80 systems, direct user interaction with memory locations and internal microprocessor registers and compatibility with all 8080 and 8085 systems as well as the Z80, an AQ spokesman claimed.

The analyzer can be used for product development, production testing and field service and needs no separate terminal, no memory allocation and no address or I/O port assignment, he added.

The fully buffered probe clips directly to the microprocessor chip in the system being tested. The chip can re-

main in the socket or be soldered in, eliminating the possibility of damage, according to the vendor.

The user can reportedly examine or modify all memory locations and I/O ports and all internal 8080, 8085 and Z80 registers, including the program counter and stack pointer.

Programs can be single-stepped by

machine cycle or instruction step or run at adjustable speeds of 1- to 4,000 step/sec while examining memory or registers. The program trace recorder can store 128 instructions, which also provides a block mode of instruction stepping.

Debugging features include breakpoint and real-time monitor functions

that can be qualified to respond to read or write activity for memory reference, I/O reference or memory reference coincident with an external event, the firm said.

The AQ8080Z microprocessor analyzer with PRB80/Z80 probe costs \$2,795 from AQ Systems, 1736 Front St., Yorktown Heights, N.Y. 10598.

## Opportunity Knocking in Micro Field

(Continued from Page 61)

tising in trade magazines and through direct mail and merchandising through retail computer or book stores could all be advantageous, but these marketing practices require a certain amount of capital, the report noted.

Computer store owners, who have been in the forefront of the microcomputer revolution, presently need significantly more capital to open for business than before. As a result, a store may be out of the financial reach of many small entrepreneurs.

Even with larger overheads, however, stores will continue to grow in number, according to the report.

The report also cited the increasing number of franchises appearing around the country. A franchise can be a basis for support and assistance and can be lucrative for both parties, or it can be a rip-off for the small businessman, the report warned.

The success of the franchise often depends on the newcomer's knowledge of business. If the microcomputing enthusiast has no business background, a franchise might be the best way to launch a new career.

Although complete hardware/software packages may one day phase systems houses out of existence, that day is not here yet; systems houses are still in great demand, the report indicated. Systems house work can be done by one person in a basement-style organization, but almost any approach will contribute to the fulfillment of growing user needs.

Entrepreneurs are also needed in consulting, robotics, microcomputer peripherals manufacturing, data base services, equipment maintenance and publishing, the report noted.

In choosing a business to pursue, prospective business people should make use of their own backgrounds and knowledge and avoid relying on others. The beginner must not be overwhelmed by the field, but rather find out what he is best at and stick with it, trying to make his business as specialized as possible.

The prospective entrepreneur would be wise to find a commodity that can earn money without direct, continuing involvement, such as a software product or complete system. He should make sure there is a real market for the product or service and, once in business, should keep overhead down.

A market consciousness and desire for the product must be created within the user community. If users don't know about the product or don't really need it, the new business will be short-lived.

Datasearch publishes monthly reports on the retailing scene. A year's subscription costs \$36. Datasearch is at Suite 105, 5694 Shelby Oaks Drive, Memphis, Tenn. 38134.

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Edited by Tim Scannell, this report will take a look at the state of the data entry art, new methods of data entry, predictions for future changes, and unusual or interesting ways in which computer users have solved various data entry problems.

In addition, the report will include some tips on saving money — how to ingest more data for your dollar — and some new ideas on updating old data entry systems.

All-in-all, it should be very interesting reading if you have anything to do with gathering data. And if you're marketing a product or service in this field, this special report is a very good place to spread the word with your ad. Call your *Computerworld* sales representative, or Terry Williams at (617) 965-5800. Ad close is April 6th.



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## Rivals Can 'Respond Admirably'

# Amdahl Exec Says 4300 No Problem

By Jeffry Beeler

CW West Coast Bureau

SANTA CLARA, Calif. — A top Amdahl Corp. executive recently dismissed suggestions that IBM's mainframe rivals might find themselves hard-pressed to equal the price/performance of the industry leader's 4300 series CPUs.

"I see every indication that the competition will be able to respond admirably" to IBM's latest

mainframe announcement, Amdahl's deputy chairman, Eugene White, said at the University of Santa Clara, where he spoke at a recent symposium on high technology and its international impact.

In fact, most of the expected industry reaction has already occurred, White noted in an obvious reference to the recent spate of post-4300 product announcements from mainframers like his

own firm as well as ITEL Corp., Magnuson Systems Corp., NCR Corp. and Burroughs Corp.

### Not on Defensive

White disputed the contention that the 4300, or E series, with its marked price/performance improvements over its 370 series counterparts, has put the plug-compatible CPU manufacturers and other IBM competitors on the technological defensive.

"It's not a situation of the competition having to catch up with IBM, but of IBM having to catch up with the competition," he insisted. "Before the 4300, IBM was lagging behind in price/performance, and the purpose of this latest announcement was to try to close the technological gap."

White's assertion differs sharply from the opinion of some market analysts and industry observers, who fear the E series' huge price/performance gains might seriously sap the financial strength of IBM's medium- to large-scale systems rivals.

According to this pessimistic view, the 4300 series announcement has put IBM's competitors between the proverbial rock and the hard place.

If rival vendors try to match or surpass the price/performance of IBM's latest offering, the theory goes, they will have to cut their systems prices so drastically that they will prove unable to maintain their current profit margins. If, on the other hand, the rivals don't try to equal IBM's "bang for the buck," they will have lost their most important competitive edge and will experience declining sales as a result.

Either way, the competition faces a bleak business future unless it can somehow solve the 4300's price/performance riddle, some analysts and observers have warned.

(Continued on Page 66)

## Near-Bankrupt Diva Rallies

By Marcia Blumenthal

CW Staff

BOSTON — "The glare of success can blind [management] to the needs of the company. The need to shore up the foundation of Diva wasn't that glaring," Ronald S. Harmon, president of Diva, Inc., emphasized recently while recounting the company's history and current experience operating under Chapter 11.

Diva has been operating successfully under the protection of the federal bankruptcy court and anticipates emerging from Chapter 11 management by June. But when the firm comes out of Chapter 11, its high-flying days are over, Harmon stressed in an interview here.

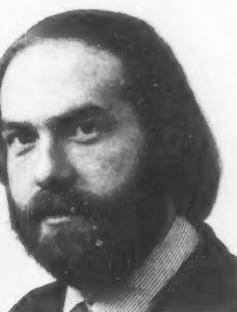
Diva in 1971 was the first independent to demonstrate a practical design for high-capacity mass storage data systems for minicomputers, particularly for the Digital Equipment Corp. PDP-11 series. Since the company's founding in 1969 by three Bell Laboratories engineers, it has been considered a technological leader in software-transparent disk storage systems.

Diva is one of the few firms that sells these plug-compatible disk storage systems for DEC, Data General Corp. and Interdata minicomputers directly to end users. Its current user base is 2,500 companies.

Although considered a high flyer during the early 1970s, the company's financial and managerial foundations were weak. Because sales skyrocketed, the foundation was ignored until it



Ronald S. Harmon



Lee N. Rubin

started to crumble in 1974 and 1975, Harmon said.

External signs of the company's erosion were absent. Sales were booming. In 1972, revenues were \$600,000; in 1974, they were about \$4.5 million; and 1977's revenues were about \$6 million.

Although sales forecasts were off, the company's expenses continued growing in relation to the forecast levels. In particular, Diva hired many inexperienced service personnel and several new sales people. These people

(Continued on Page 70)

### Back to Licensing Deals

## Byte Gives Up Franchise Program

By Marcy Rosenberg

CW Staff

SUNNYVALE, Calif. — Byte Industries, Inc., has shifted from a franchise program back to dealer licensing arrangements for its Byte Shops.

Byte, whose computer retail stores evolved out of cooperative dealer arrangements, began to develop a franchise program about nine months ago. Former directors of Byte came from Computerland, which operates its network of retail outlets on a

franchise basis.

The ex-Computerland management wanted to institute a similar franchise program at Byte, according to David Pava, recently promoted from director of Byte's retail operations to general manager.

Pava moved into the general manager slot at the beginning of the year to replace Cris Lundberg, "who left Byte to pursue other career interests," the firm said. Lundberg went to Byte in March 1978 from Computerland.

"We recognized flaws in franchising at the outset," Pava said. Under the franchise program, Byte would charge store proprietors franchise fees up front and then 8% royalties on sales.

"With the kinds of volume these computer stores are maintaining — close to \$1 million in sales — charging 8% royalty fees creates a very disgruntled franchise," he said.

Byte currently operates 75 retail stores clustered in the San Francisco area.

(Continued on Page 68)

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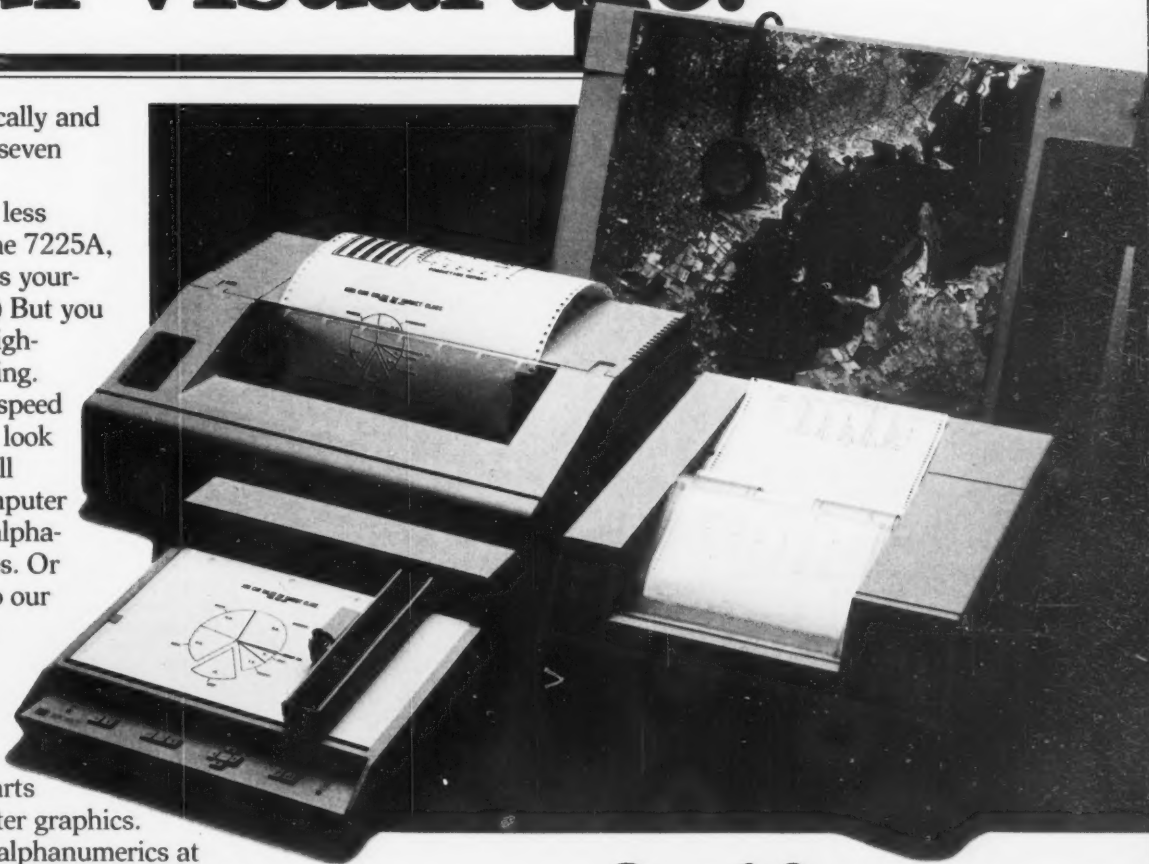
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# Get Jump on Other Nations

## France, China Sign Technology Transfer Pact

By Bohdan O. Szuprowicz

Special to CW

While various industry observers and forecasters are speculating on the potential of the China market for Western computers and information processing technology, the French computer industry, supported by its government, may have already preempted the China market in a spectacular five-year government-to-government DP technology transfer agreement.

Last December, a top-level

20-person Chinese delegation was hosted in Paris by Andre Giraud, France's minister of industry. The purpose was to work out a long-term Sino-French trade agreement, with protocols for specific industries outlining their trade and cooperation opportunities.

A prominent member of the Chinese delegation was Chien Min, minister of the Fourth Ministry of Machine Building, responsible for all of information processing and electronics industries in China

and a major element in the Chinese military-industrial complex.

The Chinese minister signed a cooperation agreement under which the French computer industry and the Fourth Ministry of Machine Building will develop Chinese computer and electronics industries. Min admitted in an interview with the editors of a French computer publication that while China manufactures computers, production is irregular, there is insufficient choice of peripherals and a dire need exists to develop better software.

### Political Rationale

During discussions in Paris, it was also stated that China turned to France for assistance in developing its DP industries for political as well as technological reasons. It was pointed out that Charles de Gaulle granted diplomatic recognition to China eight years before other Western countries and that France always maintained a clearly independent posture in the international arena.

This probably means that much of French hardware has been developed independently of American or British designs and may not come under some of the strict export controls of Cocom, which in some quarters is regarded as a severely limited factor in high technology sales to communist countries.

The Sino-French protocols consist of six articles that spell out the extent of cooperation between the information processing and electronics industries of the two countries. In the area of computers, the protocols specifically cover cooperation in the realm of large DP systems, minicomputers, microprocessors, peripherals, computer networks and software.

In electronics, cooperation will proceed in telecommunications, instruments, air traf-

fic control, maritime communications and electronic components, particularly in the area of integrated circuits and special tubes.

### Nature of Agreement

The nature of this cooperation will include exports of French hardware to China in the form of complete turnkey projects as well as equipment subassemblies and components for manufacture in China.

More importantly, France agreed to license production of certain hardware in China, provide technological know-how and train personnel in France as well as in China. Specifically, France agreed to provide production and testing equipment and management assistance for organizing manufacturing plants in China.

At least a dozen French hardware and software suppliers now see a great opportunity to capture a lion's share of the Chinese computer market for some years to come. They point out that even the recent sale of computers to China by Control Data Corp. hinges on turnkey sales of seismic exploration centers by Compagnie Generale de Geophysique (CGG).

Of the total contract value of \$69 million, only \$26 million worth of equipment will come from the U.S. and \$33 million will be value-added by Control Data France.

Another \$11 million of contract value represents software and specialized equipment that will be developed by CGG, which remains the prime contractor.

CII-Honeywell, the largest hardware manufacturer in France controlled by French interests, is considering licensing the production of System 64 and Mini 6 central processors in China as well as a facility for manufacture of printed circuits.

Logabax is discussing sales

and production of its CRT terminals, printers and floppy disks as well as intelligent terminals.

R2E, a leading French microprocessor manufacturing firm, is considering licensing the production of its Micral 80/30 microcomputers. Thomson and subsidiaries, which form a large French electronics conglomerate, are expected to provide their Solar minicomputers and peripherals that are particularly adaptable for process control applications and their integrated circuit production know-how.

Benson, FRB Connectron, TRT, Pyral, Sagem, SAT, Isostat and some other French hardware manufacturers are also jumping on the Sino-French DP bandwagon.

The associated problem of software development is not forgotten. CAP Sogeti, one of the largest French software and service organizations, is in line to provide special assistance to set up a Chinese National Software Development Center.

### Ten-Year Pact Assumed

Most French DP firms were invited to visit China starting last January to discuss specific contracts with their Chinese counterpart organizations. Although the basic trade agreements are to run for five years, industrial discussions and protocols are being developed on the assumption that the Sino-French technology transfer will continue for the next 10 years.

If the French companies sign all the proposals envisaged by the Sino-French protocols, the resulting French DP exports coupled with domestic Chinese production will leave only small and occasional pickings for other DP suppliers. On the other hand, it could turn out to be one of the Chinese "feigned leaps to the side" to try to relax the existing export controls of other Western nations.

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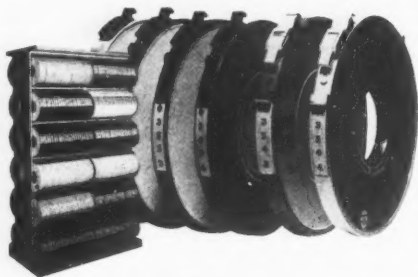
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## White: No Problem With 4300

(Continued from Page 63)

White questioned this pessimistic prediction when interviewed privately after his symposium address, entitled "The Impact of High Technology and the Large Computer System."

### Japanese Dismissed

During a post-address question-and-answer session, the Amdahl deputy chairman voiced another dissenting opinion when asked to assess the potential dangers of increased Japanese penetration in the domestic computer and electronics market.

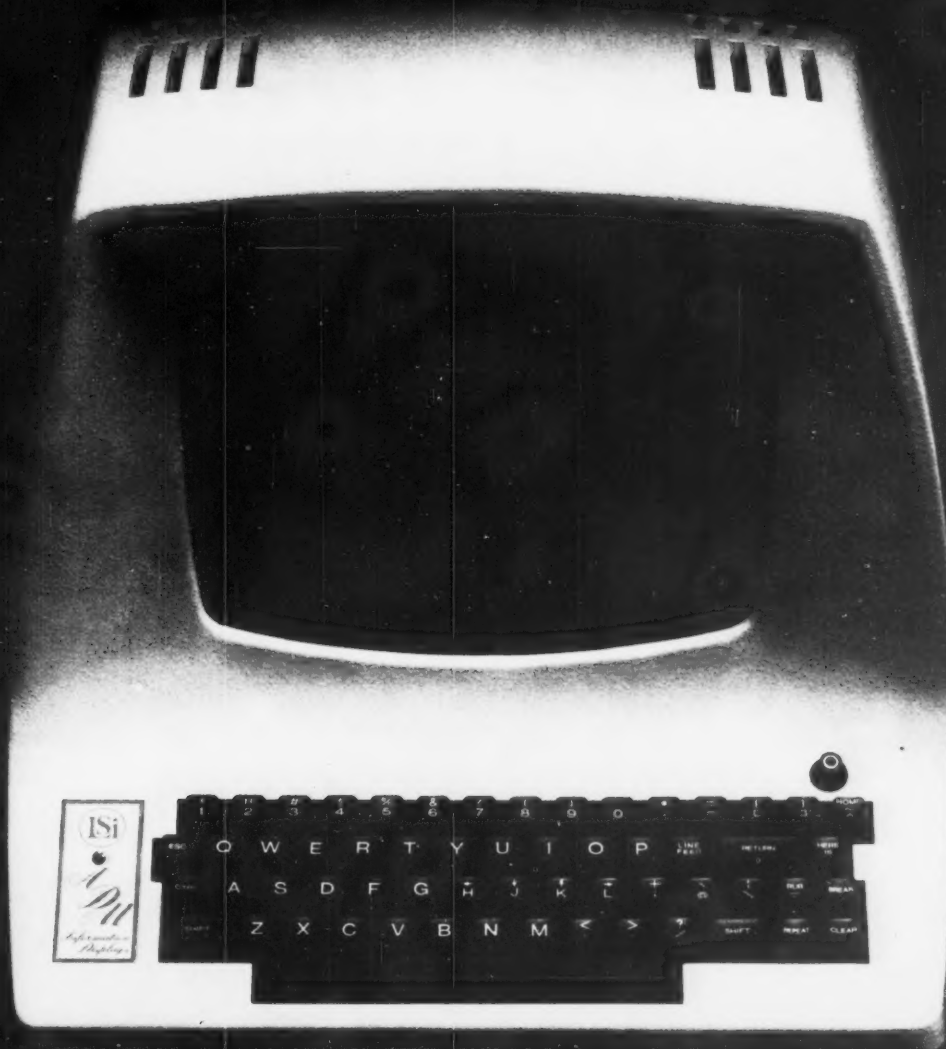
Unlike executives of many other U.S. high-technology firms, White expressed doubts that the Japanese will emerge as a major force in the domestic mainframe market in the foreseeable future. "I think there's too much technological creativity in this country for Japanese firms to make much of an inroad here," the Amdahl official observed.

White dismissed widely expressed fears about possible Japanese competition as "just a lot of jazz" circulated by some American companies to buy time while they hastily reshuffle their management and

technological priorities.

In the past, he said, many U.S. vendors have largely overlooked the need for long-term product planning in their haste to capitalize on short-term opportunities. Now, many of these firms are beginning to recognize the error in their ways and are trying to make amends by taking a more farsighted approach.

As domestic vendors increasingly formulate long-range strategies and put them into action, the furor over an impending Japanese electronics invasion will steadily subside, White predicted.



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## Wescon Theme Unveiled

SAN FRANCISCO — "Gateway to the Eighties" will be the theme of this year's Western Electronic Show and Convention (Wescon) on Sept. 18-20 here.

Some 450 exhibitors will display equipment in 750 booths at Brooks Hall and the Civic Auditorium, a Wescon spokesman said.

Sponsored by the Institute of Electrical and Electronics Engineers (IEEE) and the Electronic Representatives Association (ERA), the show will include 35 technical and professional sessions at the St. Francis Hotel.

Ushering in the show will be an all-day marketing conference and keynote luncheon at the St. Francis on Sept. 17. Dr. John R. Pierce, pro-

fessor of engineering at California Institute of Technology, will deliver the keynote address, entitled "One World of Communications — All Digital." Pierce was former executive director of Bell Telephone Laboratories' Research-Communications Science Division.

Wescon attendance is projected at 40,000. Exhibitors will include Digital Equipment Corp., Intel Corp., Zilog, Inc., National CSS, Inc., National Semiconductor Corp., Tektronix, Inc., Sprague Electric Co. and Mostek Corp.

A \$5 admission fee covers sessions and exhibits. More information is available from Laurie Hynes, Wescon, 999 N. Sepulveda Boulevard, El Segundo, Calif. 90245.

## Byte Ends Franchise Plan

(Continued from Page 63)

cisco and Los Angeles areas under a dealer licensing program. The program grants dealers the right to use the Byte Shop name if they buy all initial store stock from Byte and at least 40% of total store inventory on an ongoing basis as long as Byte's prices remain competitive.

According to Pava, the program gives dealers the benefits of a franchise without having to pay franchise fees or royalties on sales. Byte recommends particular products, provides technical support and services, aids in selecting store sites and offers mutual financing.

To improve upon its original dealer licensing program, the firm will in addition support stores with cooperative advertising programs and supply standard fixtures and architectural designs,

Pava said.

Industry sources claim Byte is losing money on the dealer program and control over its dealer stores. Jeff Boetticher, Byte distribution director, said those claims are "unfounded." Sales continue to go up monthly.

Byte intends to expand its dealer network plus open a number of company-owned stores, he added.

Plans call for the firm to add four stores a month for a total of 300 to 400 by 1984, of which 10% will be owned and run by the company. "We want to duplicate the clustered effect nationally in the top 20 U.S. retail markets," Pava said.

With the decisions to expand and continue dealer licensing arrangements, Byte has restructured operations and line management. Mike Chase, former Byte franchise development representative, has been named to the just-created post of new dealer development manager.

In addition, Byte plans to hire regional field representatives to interface between the corporation and its stores, according to Boetticher, who previously assumed that responsibility for the current 75-store network as zone operations manager.

In the future, all regional reps will report to Boetticher as distribution director. Named San Francisco Bay area regional field rep was Charles Babb, a Byte Shop retailer.

### Strong Commitment

Byte claims a strong commitment to the retail industry that presently accounts for about \$250 million in hardware computer sales alone and could reach \$3.5 billion by 1983, according to Pava.

Byte sells retail products to the small business and consumer marketplace with computer and peripherals lines from such vendors as Commodore Business Systems, Inc., Diablo Corp., Centronics Data Computer Corp. and Hazeltine Corp.

In addition, the firm packages applications software with hardware, which it markets to its retail outlets.

Because Byte buys in quantity from and makes long-range commitments to its suppliers, "we secure substantial discounts that we can pass on through our stores to our customers and still make a profit," Pava maintained.

Byte Industries is a wholly owned subsidiary of Logical Machine Corp. Pava would not disclose sales and earnings derived from its retail business.

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## FUTURE SYSTEMS FORUM-2

## SMALL SYSTEMS POWER IN THE 1980's

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Small systems haven't replaced big systems, they've amplified their power through communication networks and a hierarchy of new applications. This leverage has just begun, according to the panelists who will be assembled for Future Systems Forum-II to be held at the Boston Museum of Science, May 22

& 23. The full range of small systems from board oriented through E Series will be discussed by leading consultants, vendors, users and university authorities. Building on the success of Future Systems Forum I, which was oriented to large system applications and technology, FSF-II will pack each program minute with new insight as to the economics, risks and payoff of future small systems applications and technology.

The Future Systems Forum-II on "Small Systems Power in the 1980's" will address key issues such as:

- Accelerating price performance trends in small systems, as users get closer to the processing power provided by advanced semiconductor technology. Which vendors will give the best package?

- Big mainframe software tools such as data base management systems will "fit" into small systems. How will this impact the use of large mainframes?

- Re-decentralization of data processing and files may occur as branch offices and plants again reinstall their own system instead of terminals. How will central management control this data base proliferation?

- All mainframes in a network environment boost demands for economical, high speed, broad bandwidth data communications. How will the carriers meet this challenge?

- Plug compatible mainframes will cover the full range of the IBM product line. How will users sort out the vendors? What role will service organizations selling small mainframes play?

### Speakers already scheduled for the FUTURE SYSTEMS FORUM include:

**Dr. Jared A. Anderson**  
President, Two Pi Corporation  
Users of IBM Compatible Minicomputers in DDP

**Alan Baumgartner**  
Director of Strategic Planning  
National Semiconductor Corp.  
System Group

**David Crockett**  
Manager H-P 300 Product Line,  
Hewlett-Packard Corp.

**Impact of Silicon-on-Sapphire Technology on Small Mainframe Performance**

**Dr. Dixon Doll**  
President, DMW Associates  
Communication and Data Base Opportunities in Small Mainframes

**Douglas Hughes**  
Manager Systems Engineering,  
Ventures Div., Cincom Systems  
Impact of Small Systems Architecture on Data Base Management

**Robert A. Fertig**  
Vice President & Director  
Technology Analysis Group  
Advanced Computer Techniques, Inc.  
E-Series Technological and Market Impact

**Patrick J. McGovern**  
Chairman  
International Data Group  
User Expectations in Small Systems Technology

**C. Oakley Mertz**  
Vice President - Research  
International Data Corp.  
Market Structure and User Migration Dynamics in the Small/Mid Range Mainframe Arena

**Jack Moran**  
Systems and Data Processing Manager  
Butler Manufacturing Co.  
Small Systems Planning for Medium Size Companies

**Michael Senft**  
Marketing Director  
Nanodata  
Microcode and Small Systems Architecture

**David Smith**  
Consultant, Exxon Corp.  
Systems Group  
Impact of Small Systems on Long-Range EDP Planning

Additional User/Vendor/Consultant speakers will be announced.

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Please reserve \_\_\_\_\_ space(s) @ \$500 per attendee at the two-day FUTURE SYSTEMS FORUM. I am including the names of all those (besides myself) who will attend on a separate piece of paper. I understand that the fee includes FORUM materials and reproductions of speakers' visual aids, lunches, refreshments, cocktails-but not hotel accommodations. I further understand that cancellations must be made by May 10 or be subject to a \$150 charge.

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Just fill in above, detach this form and mail to the address above. You will receive registration and accommodations information well in advance of the FUTURE SYSTEMS FORUM.

## Executive Corner

• Peter Robinson has been elected corporate vice-president of Honeywell, Inc. Robinson's director of the company's tax department in Minneapolis.

• Mark S. Radwin has been appointed principal scientist at Tymnet, Inc., A. Raja Rafaraman has been appointed manager of the Management Sciences Department and William G. Scheible has been named manager of network operating systems. Tim G. Zerbic has been appointed chief controller of network control.



# Computer Store Stressing Application Packages

By Marcy Rosenberg

CW Staff

FRAMINGHAM, Mass. — Increased availability of special-purpose applications software will spur wider use of low-cost personal and small business microcomputer systems by first-time users.

That's the philosophy of Richard Brown, president and founder of the Computer Store, Inc., which recently opened its third company-owned retail outlet.

"We're emphasizing applications packages rather than a variety of vendors' hardware products," Brown said. "It's virtually impossible for a retail store to support a huge plethora of hardware offerings."

Indeed, the new store here, two other Massachusetts outlets in Burlington and Cambridge as well as three Eastern franchised stores outside the state retail the computer and peripherals lines of relatively few vendors.

These include Data General Corp. Micronova business systems in the \$8,000 to \$20,000 price range; Apple, Inc. personal computers priced from \$1,000 to \$4,000; and Cromemco, Inc. MPU-based systems filling in the middle price range at \$4,000 to \$8,000.

In addition, Computer Stores carry DG and Perkin-Elmer Corp. CRT terminals, Centronics Data Computer Corp. 700 series printers and 3M Co. tapes and diskettes.

## Broadening Software Offerings

Software offerings, sold separately from hardware, are broader and will continue to expand, according to Brown. The retail outlets purchase most applications packages from software development houses such as MCBA, Inc., which supplies accounting packages for the Micronova line including accounts receivable and payable, invoicing and inventory control, payroll and general ledger. A new word processing package will be available within 30 days, Brown said.

For the Apple line, the Computer Store sells software from about 12 vendors with six to ten titles each. Prices range from \$10 for games and tutorial packages to \$500 for a retail store package that performs all the functions of an electronic cash register including inventory control and sales analysis, Brown noted.

Most Apple packages, however, hover in the \$25 to \$35 range for statistical and financial analysis programs.

Noting that personal and small business computer users account for "an enormous market for applications software," Brown predicted that in two to five years, the industry will begin developing more packages to sell into "vertical" software markets.

For personal computing, he cited increased availability of what were once considered custom applications software — packages for text editing, mailing list preparation and stock market analysis — in addition to standard games and tutorial packages.

Industry-specific business packages will similarly emerge for fuel oil dealers or florists, for instance — and become standard offerings to the small business community, Brown predicted.

Another developing trend, spawned in part by declining hardware and software costs, is retail marketing of computers and applications packages directly to consumers.

Competing against such national retailers as Computerland, Brown hopes to carve out a retail base of Computer

Stores on the East Coast. He wants to do this by expanding the number of company-owned outlets in New England and the number of franchised stores outside that area.

The company currently operates franchised stores in Rochester, N.Y., Windsor Locks, Conn., and Tampa Bay, Fla.

Computer Stores target products to individual first-time users or small businesses in the \$500,000 to \$5 million sales range. Brown noted more than 2 million U.S. companies fall into that range.

Located at the Deerskin Plaza, 680 Worcester Road, Framingham, Mass. 01701, the new outlet will be open Monday through Saturday with hours still to be determined.



Richard Brown, president of Computer Store, Inc., stands in front of the company's third retail outlet.

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## Zilog Picks Italian Firm As European Source

CUPERTINO, Calif. — Zilog, Inc., and SGS-Ates Semiconductor Corp. of Milan, Italy, have agreed in principle that SGS will be an alternative source in Europe for Zilog's Z8000 family of microcomputer circuits, its single-chip Z8 processor and associated memory and peripheral devices.

Zilog said it chose SGS as its alternative source because SGS has proven N-channel technology, a broad technical support capability and a strong marketing organization.

The proposed pact calls for Zilog to provide SGS with the appropriate design makes and technical aids to fully support these products in the European market.

The Z8000 circuits covered in the intended agreement include Zilog's 16-bit NMOS CPU chip. The following Z8000 peripheral circuits are also included: the Z-MMU memory management unit, Z-Fifo first-in first-out buffer memory, Z-CIO counter and parallel I/O, Z-SIO serial I/O circuit and Z-UPC universal peripheral controller.

Also included in the intended pact is Zilog's single-chip NMOS 8-bit microcomputer circuit, the Z8, which is both an I/O-intensive microcontroller and a memory-intensive microprocessor.

Under Zilog's earlier pact with the Italian firm, SGS-Ates continues to have rights to produce Zilog's 8-bit NMOS microcomputer circuit family, the Z80.

## Diva Rebounds From Bankruptcy

(Continued from Page 63)  
were not productive immediately, and "there just wasn't a financial cushion to cover these expenditures," Harmon said.

In part, Diva was pressured into a high-flying posture by its outside investors. Four venture capital firms had invested about \$2 million in the firm, and seed capital of about \$500,000 rounded out the funding.

These investors wanted the Eatontown, N.J.-based company to grow 50% yearly, which was in excess of the growth rate for the industry generally. It was apparent very early in the company's history that it was undercapitalized, Harmon asserted. But sales still continued to increase dramatically, even though not according to forecasts.

It took the company's top management until 1977 to realize its mistakes. Through most of 1977, losses were not that significant, Rubin claimed, but in October of that year, things really began to slide.

By the time the company went into Chapter 11 last June, it was \$2.5 million in debt. Sales for the first nine months of fiscal 1978 had slipped to \$2.5 million to \$3 million.

### Marketing Weakness

Aside from undercapitalization, the company from its start was dominated by the engineering department. Technologically oriented people must relinquish control as the company begins taking off in the marketing environment, Harmon stressed.

Harmon joined Diva in 1977 as vice-president of engineering. He had been working at Gilbarco, one of the Exxon Enterprise companies. His mandate was to put business controls on the engineering department, preventing it from controlling other facets of Diva's operation.

Subsequent to Harmon's arrival, two of the original three founders of the company decided to return to Bell Labs. The founders still retain a 30% ownership interest in Diva.

Harmon's appointment to the presidency of Diva last June followed hard on the heels of the exit of a marketing vice-president who briefly took over the presidency. "At a point where the company recognized there was a severe financial hazard, the best course of action would have been to pull in our belts. The opposite occurred.

"The marketing philosophy of 'spend more to get more' prevailed — a proven road to disaster," Harmon said describing the actions of his predecessor.

The delayed effects of un-

dercapitalization and poor management forced the company into Chapter 11 on June 13, 1978. At the same time, Diva was having trouble servicing its installed base, which further damaged its reputation and turned away potential customers, Rubin said.

### A Needed Breather

While operating under Chapter 11 hasn't been a bed of roses, it has given Diva a breather.

As Harmon sees it, Diva's choices last June were to "walk away and liquidate or try to assemble a company that could continue to operate. We still had a market and able personnel," so Diva chose to continue operating.

After going into Chapter 11, Diva pared its staff dramatically, reducing the number of employees from 150 to 35. "Nearly everyone we kept on was a hard-core employee — with the company for five years," Harmon said. "Everyone wears four hats, there are no prima donnas and everyone took a salary cut."

Diva reopened its doors under federal receivership on June 27.

Creditors have been patient, particularly commercial lending institutions, Harmon re-

ported. Since June, Diva paid off \$1 million in debt. Revenues have topped \$1.8 million.

To alleviate service problems, Diva has contracted with Syntonic Technology, the service arm of Control Data Corp., to service its installed base.

### Future Posture

The greatest problem with Chapter 11 is the inability of the company to devote its energies to future markets. "However, we are starting on product development. We have been known as pioneers and our customers are looking to us for our next product," Harmon said.

When Diva begins operating as a free agent again, it wants to be considered a technological high flyer with a conservative financial management. "I don't intend to grow beyond internal sources of revenue," Harmon said adamantly.

Because of significant cost reductions, the firm has been able to gear some of its products to the OEM market.

Between now and the anticipated end of its Chapter 11 management in June, Diva must resolve its differences with certain investors in court and come to satisfactory terms with its creditors for repayment of back debt.

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Univac has been awarded a \$7.6 million contract by the U.S. Department of Agriculture for its Univac 1100/82. The system will principally handle the work load for the Forest Service, Food and Nutrition Service and Soil Conservation Service.

Hughes Aircraft Co. received a \$7.2 million Air Force contract for work on an information distribution system.

Penril Corp.'s Data Tech Division has been awarded a \$1 million contract by Ferranti Computer Systems Ltd. of England for nondestructive ferrite core memory systems.

General Telephone & Electronics Corp. has received a \$2.3 million contract to produce a mobile DP system for the U.S. Army.

Hazeltine Corp. has received awards of more than \$1 million from the Navy Aviation Supply Office for Navy aircraft spare parts and assemblies. The spares will provide fleet support for the control Indicator Group and Identification Friend or Foe (IFF) detector-processor equipment installed in the U.S. Navy/Grumman Data Systems Corp. E-2C Hawkeye Airborne Early Warning aircraft.

Dataquip Corp. has been awarded a \$230,695 contract from Martin Marietta Aerospace for central data system equipment to be installed and maintained at Vandenberg Air Force Base, Calif.

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# At MAI, Recovery From Bankruptcy Complete

By Connie Winkler

CW Staff

NEW YORK — Management Assistance, Inc. (MAI) is the story of boom, bust . . . and boom.

Nine years ago the a computer leasing company, was on the verge of bankruptcy. Today it is prospering with three wholly owned subsidiaries: Basic/Four Corp., a maker of small business systems; Sorbus Corp., a service group; and Wordstream Corp., which is aiming for a top slot in the word processing market.

"Necessity is the mother of invention," Raymond P. Kurshan, MAI president and chairman of the board, said in explaining MAI's success.

The firm's recent growth has been impressive. Revenues rose from \$64 million in 1970 to \$205.5 million in 1978. "Since 1973, we have doubled in size every three years," Kurshan said.

## Teetering on the Brink

In the late 1960s, MAI leased \$200 million worth of IBM computer and unit record equipment. At its height, MAI generated revenues of \$60 million a year. Then the leasing market collapsed and MAI — like many leasing companies — teetered on the brink of bankruptcy.

"It was a very bleak situation," Kurshan recalled. "We were technically insolvent." In 1971, for instance, the company had a loss of \$28 million and was in debt for \$150 million.

It was time to do something. MAI developed a new cash-generating product, a small business computer system called the Basic/Four. In addition, the firm reorganized its 1,300 service employees into a separate division, Sorbus, to expand its maintenance business.

The tactics "born of necessity" worked. For the first quarter of fiscal 1979, the company reported revenues of \$61 million and earnings of \$5.3 million or 66 cents per share. This compared with \$44.9 million in revenues and earnings of \$3.7 million or 46 cents per share in the comparable period a year ago.

"We felt IBM was here imperturbably," said Kurshan. One of the first companies to take advantage of the 1956 Consent Decree that required IBM to offer its equipment for sale, MAI started leasing IBM equipment in 1961.

## Change of Fortune

By 1970, however, IBM's 360 series had made MAI's equipment portfolio obsolete and the country's economy was suffering. "We were shipping equipment back faster than we could ship it out," Kurshan recounted. "The market was shrinking; people were not anxious to rent unit record equipment."

Between 1967 and 1973, MAI did not have one profitable year. In 1970 the company made a \$35 million adjustment to the books just to keep itself going. "In a practical sense, we were in liquidation," Kurshan said.

Change was in order. The company refinanced \$90 million of its debt — with Kurshan holding the hands of the New York bankers — and reorganized the corporate structure. Kurshan was named top executive. The new MAI was a marketing group built around the anticipated Basic/Four product and

the Sorbus maintenance group.

What the company really needed at that point, however, was to pay its debt. Coming up with the cure-all product was no easy task because MAI had limited resources and no research and development capability.

MAI discovered there were no computer systems for the small business with 25 to 250 employees and \$1 million to \$100 million in annual revenues. These small entrepreneurs used bookkeeping machines instead.

## Basic/Four Components

Originally, MAI assembled the Basic/Four product by buying components from several vendors. The processor was from Microdata Corp., the terminals were from Hazeltine Corp. and

the mini's operating system, Boss, was acquired from Dartmouth University. Today Basic/Four, now based in Tustin, Calif., does its own manufacturing down to the component level.

Ironically, MAI's brush with leasing company disaster also left it at the doorstep of success because it already had marketing and service organizations in place.

## Service Sells

"Good service sells a product; poor service acts as a deterrent," Kurshan said, noting Sorbus, now a separate MAI subsidiary, supports Basic/Four products and took on other computer maintenance job contracts. It serves 9,000 domestic end users today.

Where does MAI go from here?

Banking on the durability of the office-of-the-future trend, the firm is marketing a 12-station diskette storage, shared-logic and data base word processing system — Wordstream, targeted for banks and insurance customers.

MAI tried unsuccessfully to develop its own word processing system. At the same time, it sought to acquire another company that had developed text editing systems. In October 1977, MAI acquired Avionics Products Engineering Corp., changing the Avionics product name to Wordstream.

During 1978, MAI set up 13 U.S. Wordstream sales office, and the company now sees itself as a strong competitor in the office-of-the-future market.

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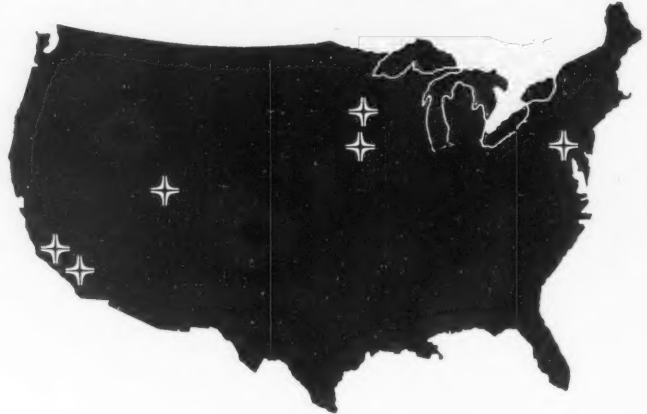
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Send all resumes and inquiries to:  
Dr. August R. Freda Chairman  
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Univ. of Pittsburgh at Bradford  
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Deadline for application is  
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## DATA PROCESSING OPPORTUNITIES AT ITT CANNON ELECTRIC!!

Orange County headquartered ITT CANNON ELECTRIC, a leading manufacturer of electrical interconnect devices, is enjoying dramatic growth and currently has numerous openings in its expanding Information Services Department. The environment includes an IBM 370/158 with VM, DOS/VS, CICS, CMS, POWER, RJE and TOTAL. Currently we are supporting 6 divisions at 4 geographic locations in North America.

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To design and implement marketing systems in support of customer order follow-up and distributor sale offices. A minimum of 5 years experience in Systems Design. Must have the ability to communicate with the programming staff through the use of detailed program specifications and flow charts. BS degree highly desirable.

### PROGRAMMER ANALYSTS

Minimum of 2 years experience programming with COBOL in a 370/DOS/VS environment. Working knowledge of TOTAL-DBMS, CICS and CMS a plus.

All of the above positions carry competitive salaries and a strong benefit program which includes major medical, dental, long term disability, family accident, family life, and a savings investment program (after 1 year of employment).

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- Opportunity for personal and professional growth.
- Opportunity to work for a firm that has a good balance between commercial and military products.
- In-house business masters programs.
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Attn: Mr. Bob Bardini  
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R.J. Reynolds Tobacco Company, an affiliate of R.J. Reynolds Industries, Inc., has an opening for a highly skilled systems professional with extensive experience in developing an automated warehousing/distribution computer system. This is a new position and offers a tremendous challenge to the qualified applicant. Applicants for this position should possess the following:

- Bachelor's Degree (or higher)
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ADR is the #1 software products company in the world. We are large enough to be stable and respected, small enough to be informal—with room for personal recognition and professional advancement. Our attractive Princeton, N.J., location offers a quiet rural environment within easy reach of both New York City and Philadelphia.

We are currently embarking on several new projects to develop the software systems of the 1980s. The result is an immediate need for a variety of talented data processing professionals from support specialists to senior system analysts. Call us collect in Princeton at 609/921-8550 if you have experience in any of the following areas:

- **Assembly language and OS**  
Work on ROSCOE, our online program development system for OS. Work is in progress or planned in 1) secure operating environments; 2) problem-solving, interactive languages; 3) enhanced man/machine interface; 4) distributed processing. Requires several years of Assembly language experience. Call Alan Polk.
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Assist in the design and implementation of performance measurement tools for DOS/VS. Requires Assembly language and knowledge of DOS/VS internals. Familiarity with performance measurement helpful. Minimum two year's experience and/or college degree preferred. Call Philip J. Berg.
- **Online systems and display terminals**  
Assist in the design and implementation of an online program development/generation system. Requires familiarity with commercial applications, data base concepts and language processors (compilers, interpreters, and query languages). Programming experience with display terminals and/or a CS degree preferred. Call Adam Rin.
- **Assembly language, MVS and VSAM**  
Assist in the design and implementation of a source management system for online and batch access. Requires several years of Assembly language experience and familiarity with VSAM and MVS internals. Knowledge of data base concepts and/or a CS degree preferred. Call Ralph V. J. Lanni.

### SUPPORT POSITIONS ALSO AVAILABLE

We are also looking for talented people to fill a variety of support and documentation positions. Please call Ed Smith, Personnel Director, for more information on any of these openings.

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- **The LIBRARIAN**  
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- **LOOK**  
Aid customers and ADR field representatives in the use of our performance measurement product line. Good communication skills essential. Some familiarity with OS and/or DOS internals highly desirable. Light travel.

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Present the MetaCOBOL Product Group to new prospects. Requires COBOL programming and commercial applications experience. Good communication skills essential. Traveling required.

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We have openings at all levels for writers and editors to research and write both internal and end-user documentation. Requires English or Journalism degree and/or previous technical writing or data processing experience. COBOL programming experience preferred.

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These positions are immediately available as a result of a newly funded, multi-year program. The program goal is to provide a more controlled and effective MIS environment through the proper utilization of software, hardware, and human resources. Bright and energetic individuals are needed for the following positions:

#### Control Advisor

A highly qualified individual is needed to be responsible for identifying, analyzing, developing and finalizing MIS control policies, directives and standards. You will monitor measures to provide a more controlled MIS environment, actively participate and/or lead planning activities directed at the development of measures affecting MIS groups or remote sites, and perform project leadership. Ideal candidates will have at least 5 years' experience in at least 2 of the following: application systems development using COBOL or PL/I, systems programming, or computer operations. You should also have exposure to IBM 370/158 VM or 168 MVS computing systems, TSO or equivalent time sharing capability, and distributed computing using SyFA or equivalent minicomputer systems. Related college degree or equivalent highly desired.

#### Software Consultant

##### Host Computer

Project management skills and a strong interest in state-of-the-art methodologies, software and hardware are prime prerequisites for this position. You will assist with the tape library management system installation, implementation of automatic scheduling systems, backup and recovery, and provide technical training. Extensive experience in implementing, monitoring and modifying large MVS/JES2/TSO/SMP experience required. VM/370/CP/CMC/RSCS experience desirable. A thorough knowledge of the systems development cycle is also desired.

#### Software Consultant Distributed Systems

If you're motivated by a strong interest in state-of-the-art methodologies, software and hardware, this could be the ideal opportunity for you. You will be responsible for creating software and/or procedures to improve productivity and effectiveness. You will also present in-house seminars and be responsible for supporting and writing distributed systems software. Extensive experience in implementing, maintaining and modifying large and/or complex distributed processing computer systems is required, including Assembler/Machine or SYBOL language background.

#### Senior Applications Programmer

You will provide application programming resource to enable MIS groups to implement backup and recovery measures. Experience in designing, implementing and modifying large computer systems and a thorough knowledge of VS/ANSI COBOL and/or Optimizer PL/I, IBM OS/VS JCL and TSO are required. Comprehensive knowledge of the improved programming technologies, and basic knowledge of database and on-line system concepts are also needed.

#### D.P. Research/Consulting

A challenging position with variety and visibility could be yours if you qualify for this internal MIS position. You will be responsible for researching, analyzing and developing internal MIS techniques, policies, and methods in conjunction with top management. The ideal candidate will have experience in most of the following areas: systems analysis/programming, EDP security and audit controls, database concepts, COBOL, PL/I, MARK IV, IBM OS/VS, distributed systems and system development methodologies.

#### Data/Resource Administrator

We need a top administrator to assist with the implementation of a resource access system and backup/recovery procedures, process requests for access to data or resources, and investigate/resolve exception conditions. 2 years of college-level coursework or equivalent experience and 2+ years as an applications or systems programmer in an IBM 370 MVS environment are needed to qualify. Familiarity with JCL and TSO highly desirable.

#### Production Certification Specialist

Administrative and organizational skills are a must for this key position. Responsibilities will include assuring the accuracy of computer programs passing from development to production, adherence to standards, and backup and recovery. Duties will also include providing change control function for modifications, maintaining central program documentation files and performing production installation procedures. 2+ years of college-level coursework or equivalent experience required. Data processing experience, specifically JCL and job scheduling preferred.

If you have the qualifications we seek — if you're looking for optimum challenge and visibility — and if you're good where you are, you'll be great at Fairchild.

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Fairchild is proud of our efforts as an affirmative action employer and we encourage women, members of minority groups and the handicapped to apply.

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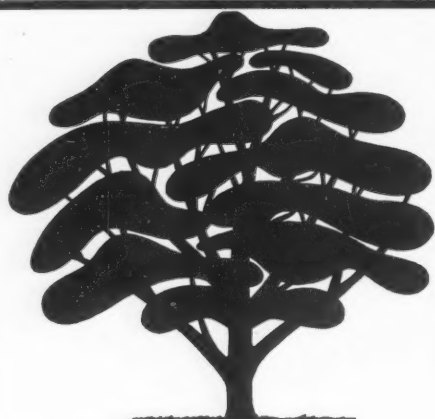
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- Communications Network Architecture
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- Message switching
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### Interested?

Then send us your resume and salary history and we'll get back in touch with you. Aramco Services Company, Section DOM, Dept. CPW0402L, 1100 Milam Building, Houston, Texas 77002.

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#### SYSTEMS ANALYST

If you have 3 or more years experience in manufacturing applications, with 1-2 years in systems analysis, this is your opportunity to join a leader in on-line manufacturing systems. Experience should include inventory control, MRP, shop floor control, BOM and related application areas with COBOL, IMS experience.

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The successful candidate will possess five or more years experience including 3 years of systems analysis and programming with personnel, sales, marketing and accounting systems and at least one year as a project leader.

#### SYSTEMS ANALYST

If you have 3 or more years experience in financial applications, with 1-2 years in system analysis, this is your opportunity to join a leader in on-line systems. Experience should include labor reporting and payroll, sales analysis, accounting, order entry and marketing with a COBOL, IMS background.

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Candidate must have 1-3 years experience in a financial or manufacturing systems environment. Some analysis and programming knowledge is required. Structured techniques, COBOL, IMS exposure is desirable.

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Requires 5 years overall experience, including real time programming in assembly language and FORTRAN in a data acquisition application using mini-computers. Experience with PDP 11 systems under RSX11M preferred. Successful applicant must also have a degree in computer science, engineering, or related disciplines.

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Requires 5 years overall experience, including 3 years on MRP software as well as Hewlett-Packard 3000 series mini background. Must have a degree in computer science, engineering or related field.

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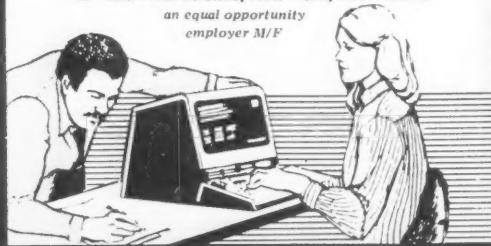
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Please send resumes to Ms. Dottie McCann, Senior Staffing, Martin Marietta Aerospace, P.O. Box 29304, New Orleans, LA. 70189.

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Digital has immediate openings for software specialists in many locations. We are holding a series of Career Days so that we can learn about you and you can learn about the exciting dynamic career opportunities at Digital. Because of our fantastic growth, you'll get a chance to move up faster than you would anywhere else.

Our New York and New Jersey Career Days will be held on April 7th, from 9am - 3pm at the locations listed below:

Somerset, New Jersey  
Weston Canal Road, Exit off  
Route 287  
(201) 469-9211 ext. 999

New York City  
One Penn Plaza  
(212) 971-3320

Career Days will also be held on April 21st at the Digital offices listed below:

Washington, DC  
(301) 459-7900, ext. 450

Atlanta, GA  
(404) 455-4201

Philadelphia, PA  
(215) 825-4200, ext. 282

Charlotte, NC  
(704) 525-7150, ext. 217

Please call Monday - Friday for an appointment and directions. If you are unable to attend a Career Day or if you would like early consideration, rush your resume and salary history to: Mr. Sylvain Elzam, Digital Equipment Corp., U.S. Route 1, MS CW, Princeton, NJ 08540. We will route your resume to the Digital office nearest you.

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# digital

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Our business is devoted solely to the placement of computer professionals. Our marketplace is international and is served by us and our network of over 200 affiliate offices covering virtually all of North America. The listing below represents but a few of the hundreds of openings we have in the computer field at salaries ranging \$18-36,000.

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Experience using RT-11, RSX-11M, OS8 or VAX/VMS operating systems and FORTRAN IV-PLUS, PDP-11 MACRO, VAX-11 MACRO, PASCAL and/or PL1.

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To generate, apply and verify VSI, SVS, VM or MVS software. Should have working knowledge of at least one of the above operating system internals, utilities, SMP and assembler language.

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Programming in large scale IBM environment using ANS COBOL or PL1. Data base experience (CICS, IMS, DBMS, DL1 and/or DB/DC) very helpful. Manufacturing, financial and personnel applications.

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**The New York Times**

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Data Processing

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Personal and professional satisfaction, and a successful career path are vital reasons for considering a prospective employer. At Motorola, the industry leader in the design and manufacture of superior communications systems and precision components, we provide the climate necessary for individual achievement. We invite your participation in our continuing success.

Essential requirements include experience with ANSI COBOL/OS operating systems, and knowledge of JCL. Also preferred is a background in IMS/DB, TSO, RJE and MARK IV. Exposure to manufacturing application areas will be a valuable asset.

We are a company internationally known and well-positioned to offer the qualified candidate an excellent compensation program and outstanding career advantages. For consideration, forward resume, complete with salary expectations, in confidence, to:

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We invite you to explore with us. You can go as far as you'd like in your career, the way we've gone in our endeavors; we don't believe in limitations. A stimulation environment goes hand in hand with continuing challenge for senior professionals and learning opportunities for junior and intermediate personnel. And, certainly our "open-door" management policy contributes to excellent employee relations. We offer a competitive compensation and a fringe benefits program that includes company-contributing stock purchase and pension plans, tuition reimbursement, relocation allowance, life and medical insurance coverage, and more. In addition, you'll experience professional and personal satisfaction in establishing your own limits.

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All positions require a college degree (or equivalent experience) and a minimum of 3 years' directly related writing experience. TI offers competitive salaries and a full line of benefits including company paid relocation.

If you have talent, experience and a keen interest in making the most of your career, we have the challenge and the opportunity for you. Call us now to schedule an interview. Call collect (512) 250-7242 during normal business hours, or send your resume in confidence to: Staffing Manager/P. O. Box 2909, M.S. 2208/Austin, TX 78769.

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Engineer

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After several months training on the Superscale CRAY 1, the successful candidate will be assigned to a customer site. These positions offer excellent growth opportunities, salary and company benefits. Send resume and salary history in complete confidence to:

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## Field Engineering

The Prime opportunity is really YOUR opportunity. Your opportunity to join a firm who's goals are higher than most -- to grow faster than the growth rate of the industry. We're well on our way toward achieving that objective. And if YOUR goals are high, you can play a significant part at one of Prime's several facilities, coast to coast.

Field Engineering requirements include 3-5 years experience in computer installation and preventative maintenance. Plus expertise in disk, tape and communication devices is a must.

The Prime benefits package includes company-paid dependent coverage, dental insurance, educational assistance and more. Plus a lot less travel than what you're probably used to.

If you want more visibility and an opportunity for professional growth at Prime, please send your resume with salary history to the Prime location most convenient for you.

Opportunities exist in major cities in the following states:

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Oak Brook, ILL 60521  
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# PRIME

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National Data Corporation's Cash Management Division is offering you the excitement and opportunity for career advancement that can happen only in a rapidly growing organization. We are large enough, \$42 million revenue, to get the job done right, but small enough to offer individual recognition for outstanding performance.

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• Time sharing • Tape Transmissions • Customer Service

These three functions make up a fast paced support group whose sole mission is to keep our many customers satisfied with our unique services.

**QUALIFICATIONS** - The successful candidate will have experience in the Data Processing Service industry and some management experience with both professional and support personnel. A working knowledge of systems with emphasis on large scale real-time operations is essential along with the ability to deal effectively with our customers, many at the Vice Presidential level.

**THE REWARDS** - We offer an attractive salary, excellent relocation package and an opportunity to join a growth company that has become one of the success stories of the 70's. Combine this with the excellent quality of life waiting for you in Atlanta and you have the perfect package.

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**-NDC**

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Challenging opportunity for a motivated systems software programmer to participate in the development of a distributed medical information system in a large, progressive medical center in the central California valley. We are located in a growing community only minutes from the High Sierras and a relatively short distance from Pacific Ocean beaches.

Hardware includes a DEC System-2040 interfaced with PDP 11/34 CPU nodes and peripheral equipment. Responsibilities will include maintenance of all DEC operating systems and vendor supplied system software.

Experience requirements must include an in-depth knowledge of an assembler language, preferably DEC-20 Macro. Familiarity with any DBMS, networking, and on-line systems development would be a plus. Salary in the twenties depending on experience. Excellent benefits. Send resume and salary requirements to:

Mr. Rod Gay,  
Mgr. of Systems & Programming  
Fresno Community Hospital  
P.O. Box 1232  
Fresno, CA 93715  
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# COMPUTER SCIENTISTS & SOFTWARE ENGINEERS

New college grad? Seasoned Professional? Consider the exceptional opportunities that we offer qualified software professionals. We have openings for Project Managers, Team Leaders, and new Technical Contributors.

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Of course you want to be in the front rank of innovative computer technologists. Join us in solving challenging problems in computer networking, secure systems, distributed data bases, and software development techniques and tool support.

At our Western Development Laboratories, we are solving these problems with a strong program that blends R&D, contracts, and internal projects.

Here are some of the areas which we consider particularly important:

### SOFTWARE DEVELOPMENT TECHNOLOGY

- Programmer's Workbench/UNIX\* internals
- Development support tools and systems
- Specification languages
- Program design languages
- Requirements analysis tools
- Microprocessor development systems

\*UNIX is a Trademark of Bell Laboratories

### SECURE SYSTEMS TECHNOLOGY

- Formal specification & program verification
- Secure operating systems
- Test and validation
- Tagged computer architecture

### COMPUTER NETWORK TECHNOLOGY

- Local high-speed networks
- Protocols
- Fiber optics

### DATA BASE MANAGEMENT TECHNOLOGY

- Distributed DBMS
- Distributed interactive work stations

## JOBS YOU SHOULD CONSIDER...

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You will use modern systems programming languages running in a PWB/UNIX environment to develop operating systems, software tools, DBMS's, and network implementations. These positions will be filled with new graduates and provide excellent opportunity for technical growth.

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You will draw upon your experience with several operating systems, your academic training, and your ability to conceptualize and communicate in order to design and specify a new class of operating systems. You will learn to express your design in a formal specification language and to subject your specifications to rigorous analysis.

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You will work in a PWB/UNIX environment to create tools to make the software development process more exact and less error prone. You will participate in determining the direction of research and development that leads to the next generation of software tools.

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Your knowledge of modern compiler building technology and language development will be used in the evaluation and development of systems programming languages for use in support of our secure systems technology efforts.

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Your experience in designing and implementing high-performance computer networks will provide a technical basis for key role in our local area networking programs. Experience with fiber optics is highly desirable.

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Use your formal computer science background and your experience in software quality assurance, management, and applications to develop and apply new standards to programming.

## IT'S YOUR MOVE...

To the San Francisco Bay Area If you have a BS, MS, PhD or equivalent related experience in one or more of the technology areas we've discussed. We'd like to talk with you at the Western Development Laboratories, where you will receive the professional recognition you deserve, excellent compensation, and one of the best fringe benefit packages in the industry.

Please send your resume and salary requirements to Professional Employment, Dept. CK-74, or if you wish to call, our toll-free number outside of California is 800-227-8386; within California, call toll free 800-982-5853. U.S. citizenship is required for most positions.



## Ford Aerospace & Communications Corporation

Western Development Laboratories Division

3939 Fabian Way, Palo Alto, California 94303

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## Senior Product Planner

General Instrument Corporation's Business Systems Division has an immediate opportunity in central Maryland for a Senior Product Planner to develop computer related products for the retailing industry. The successful candidate will have a bachelor's degree, strong written and oral communication skills, and three to five years experience in a product development role in the computer industry.

The responsibilities of the position include:

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- working as a catalyst in all aspects of product design and development,
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General Instrument Corporation is a Fortune 500 company with world-wide manufacturing and marketing facilities. The Division markets Unisate/Regtel point-of-sale terminals and related products. It has installed more POS terminals in full line department stores than any other manufacturer.

To apply send your resume in confidence to Mrs. Mary Gilka, General Instrument Corporation, Business Systems Division, 271 Schilling Circle, Hunt Valley, Maryland 21031.



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BUSINESS SYSTEMS DIVISION

RETAIL SYSTEMS

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computer professionals

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## SYSTEMS ANALYST

Design and assist in implementation of product development support systems. Work with the functional units, especially manufacturing and engineering, to identify their informational needs and make recommendations where computer processing can be effectively and economically utilized. Direct the assignments of programmers by reviewing and approving detail design specs and test results to insure system objectives are met.

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Responsible to design logical and physical data base structures. Seeking programmer/analyst with emphasis on file design aspects, business programming experience, data base or file design experience, familiarity with file access types, good management and communications skills. Environment -IBM 360, 370, IMS, minicomputers, data dictionary, UCC10, DML.

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## Data Processing Careers

Denver, Colorado

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Martin Marietta provides excellent fringe benefits, and interview and relocation expenses will be paid.

For complete information, please send your resume, including salary history, in confidence to Marvin Crandall, Manager, Human Resources.

**MARTIN MARIETTA**

MARTIN MARIETTA DATA SYSTEMS  
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**N** Northern Natural Gas Company

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(Reports to Manager of Corporate Systems Planning)

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Must interface with end users of data base system and with analysts and programmers to design and specify data bases and display/message formats.

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Must understand large scale data processing systems/equipment and have at least 2-3 years experience in creative problem solving and computer evaluation. Knowledge of Burroughs B6000/B7000 architecture and its operating systems/utility software (or large-scale Burroughs data communications facilities) is necessary, as well as experience on Burroughs large-scale data processing systems in one of the following areas:

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- Development or support of OS/utility software.
- Configuration/implementation of data communication facilities.

This position requires a technical degree at the BS level; an MS degree is a major plus.

We work in clean, uncrowded Omaha, where housing is plentiful, schools are excellent, the cost of living is low, and great outdoor recreation abounds. A recent study named Nebraska "No. 1 in quality of life" among the states.

Ours is a professional environment that rewards creativity. We offer an outstanding salary plus an excellent company-paid benefits package, including paid relocation. Please call Mr. Jim LaHood COLLECT at (402) 348-4403, or send your resume and salary history to us. (Confidence respected.)

## Northern Natural Gas Company

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## PROGRAMMER/ANALYSTS

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We have an excellent starting salary for those with demonstrated expertise; regular increases are based on individual merit. Our benefit package is second to none, and relocation costs are provided. If you think that individual effort is important, and want to work for a company that agrees with you, call or send your resume to Mr. Ed Lyons.

## M.I.S. International, Inc.



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## Product Support Group - Software

An excellent opportunity exists for dedicated individuals with experience to join a special group of professionals developing systems/applications software for Wang minicomputer, word processing, and virtual storage systems.

On the **minicomputer** line, projects include file management, data base management, programming aids, peripherals/support utilities, industry specialized application packages, etc. A MS degree in computer science would be ideal.

On our **word processing** line, projects include developing aids/utilities, industry specialized application packages and operating software quality assurance.

We are looking for creative, self-starting, competent individuals with proven ability to analyze word processing and application functions. MS degree in computer science or related field preferred. BS degree required.

For the **VS product** line, we need qualified BASIC or COBOL programmers for developing industry specialized applications packages. Again, we are seeking experienced, self-motivated individuals.

We offer excellent salaries and benefits. Please submit your resume, including salary history, to Merle Halverson, Professional Recruiting, Wang Laboratories, Inc., One Industrial Avenue, Lowell, MA 01851; or call her at (617) 851-4111, Ext. 3161.

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Computers

**WANG**

Word Processing

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SAN DIEGO FEDERAL, one of America's most successful, and most innovative Savings & Loan Associations, is seeking qualified candidates for the position of Senior Technical Writer with the following qualifications:

- Proven writing skills
- Strong interviewing skills
- Basic knowledge of Data Processing Concepts
- The desire and ability to train others

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## the answer is clear.



Clear Lake, that is. If you'd rather be sailing, fishing, boating, or skiing, then you should be working for Ford Aerospace and Communications Corporation. We're located in the Clear Lake area, situated by Galveston Bay, just 25 miles from the Gulf of Mexico, known for excellent deep sea fishing. Around the lake there are numerous marinas and yacht basins that distinguish the area as the boating mecca of the Gulf Coast. And we're a comfortable distance from the big city—just 30 minutes from downtown Houston.

Our career opportunities are equally attractive. As a leader in custom data processing systems for large-scale ground-based communications, command and control applications, we have immediate openings from entry level to senior level in the following areas:

**SYSTEMS PROGRAMMING:** Requires OS internals experience on micro, mini, or large scale computer systems. Design and implementation of I/O drivers, systems enhancement and system utilities is a plus.

**APPLICATION PROGRAMMING:** Will be required to design, code, verify, and document assembly language or Fortran programs for a real time system. Telecommunication and/or process control experience is a definite asset.

**APPLICATION PROGRAMMING:** Analysis in programming experience on aircraft and digital avionics systems. Assembly language programming on mini-computers desirable.

We can offer highly competitive salaries and an outstanding benefits package, as well as excellent opportunities for advancement. What's more, Texas doesn't have a state income tax. So if you're looking for a career opportunity that won't interfere with your fishing, or if you want to get away from the big city for more than just a weekend, the answer is clear...Ford Aerospace & Communications Corporation. For more information CALL COLLECT or send a resume to Mr. John Brown, Space Informations Systems Operation, P.O. Box 58487, Houston, Texas, 77058, (713) 488-1270.



## Ford Aerospace & Communications Corporation

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## Programmer/Analyst

Furman University, located in Greenville, S.C., is accepting applications for a programmer/analyst. Duties will include the analysis and programming of administrative applications for the University. The computer center at Furman uses a HP3000 series III computer and state-of-the-art programming technologies including data base, structured programming, and interactive program development. The ideal candidate should have experience with the COBOL language and with the design and implementation of on-line applications programs. Experience with the HP3000 will be very helpful but not essential. Salary and fringe benefits are competitive and commensurate with experience. Interested applicants should forward a resume including salary history and requirements to:

Mr. Alec Williams  
Director of Personnel  
Furman University  
Poinsett Highway  
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Application deadline is May 31, 1979.

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Programmer/Analysts - Commercial and Technical Applications	to 23,500
Programmers - Commercial and Technical Applications	to 20,500

Houston Data Center Expansion: (Major independent oil company with twin IBM 3032's on order, running under MVS/JES 3, IMS/VS, TSO, Data Dictionary and using COBOL and PL/I). Samples of positions available are:

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Data Base Specialists-IMS Preferred	to 29,000
PL/I and COBOL Programmer/Analysts	to 26,000
PL/I and COBOL Programmers	to 23,000
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Positions require 2 or more years of COBOL programming experience. Background in banking applications or large-scale Burroughs computer systems would be a plus. Selected candidates will enjoy valuable, broad-based exposure in the design and development of major on-line computer systems.

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We have been retained by an international computer vendor to recruit a number of individuals with proven abilities and high growth potential. Current openings are in Albuquerque, San Diego, San Francisco, Washington, D.C. and other offices around the U.S. They can offer exceptional long-term growth prospects to career-oriented professionals. Salaries for current positions range from \$20,000 to \$36,000 with an outstanding benefit package.

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Requires the ability to analyze and determine customer requirements and lead development efforts for large communications systems. Requires familiarity with C3I, WWMCCS, satellite and terrestrial communication, spread spectrum techniques and communication protocols.

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Responsible for system level reliability availability analysis assessments and trade-offs for ground satellite terminals. Interface with system and design engineers on a hardware basis from concept to completion.

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Please forward resume with salary history to: Raeburn Josey, Personnel Specialist, Harris Corporation, Government Communications Systems Division, P.O. Box 37, Melbourne, Florida 32901.



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Computer Science or related degree and at least 5 years computer application experience. Broad knowledge of operating systems and hardware. Knowledge of FORTRAN. Experience in graphics technology. Highly desirable: project management experience, mechanical engineering disciplines, management and installation of large software codes, communication protocol.

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The qualified candidate should possess 6 to 8 years experience in all facets of systems development. Emphasis on business analysis system design along with analysis of business systems applications in the financial administrative sales and order processing areas is desirable.

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### •SENIOR SOFTWARE ENGINEERS/MODEL DEVELOPMENT

Responsible for the structured development of environmental simulation models and analysis tools for interfacing with an integrated system of environmental services; MS, Ph.D. (or equivalent) in computer science, mathematics, physics, meteorology or oceanography, 2-3 years of senior level experience in software development; 5 years overall experience.

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Responsible for establishing and maintaining effective software QA methods, procedures and audits; maintain software development control systems; provide for detection, reporting, analysis and correction of all production software deficiencies; BA/BS (or equivalent) and mathematically based scientific or engineering discipline; 6 months to 1 year of data processing experience including a working knowledge of Fortran (or other scientific) programming language; must have career goal to move into model/software product development or software systems engineering within 1-2 years.

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To arrange an appointment in advance, call San Diego collect at:

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Or send your resume to Tim McEwen, Placement Specialist, NCR Corporation, Engineering and Manufacturing, Department R50, 16550 W. Bernardo Drive, San Diego, California 92127.

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## SYSTEMS ANALYSTS/ PROGRAMMERS

Sperry Univac needs a few key people experienced in medium and large scale systems. Candidates should be knowledgeable in one or more of the following areas:

- On-line, real time processing (CICS, IMS and TDS)
- Data base applications or design (IDMS, S2000, EDMS, TOTAL, IMS or other similar systems)
- Experience in conversion or migration between operating systems.
- SYNTAX analysis or compiler development skills.
- Multiple language experience
- ASCII COBOL/PL-1/FORTRAN/APL
- Sperry Univac 1100 Series
- Computer instruction/experience in design and instruction of computer training courses.
- Time Sharing
- Multiple vendor experience
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These openings exist in our Customer Support Services organization and afford travel opportunities. Assignments are on the Univac 1100 Series Computers, are highly varied and offer the applicant maximum exposure to many technical disciplines and diverse applications.

Please submit resume and salary requirements to:

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### PROJECT LEADER & TWO PROGRAMMERS FOR LARGE COMMERCIAL BANK

Gulf Computing Systems, a leading Data Processing consulting firm, based in Kuwait, is seeking three Data Base experts for the second phase of a Letters of Credit Processing system for one of their major banking clients. Applicants should have the following qualifications.

#### PROJECT LEADER

- 5 - 10 years Assembler/CICS experience
- In-depth knowledge of Assembler language
- DL/1 Experience
- Good general banking background. Knowledge or experience of Import Letters of Credit is a definite plus.

#### PROGRAMMERS

- 3 - 5 years Assembler/CICS
- DL/1 Experience
- Some banking experience preferred.

The duration of this project will be 12 - 18 months. Salaries will be commensurate with experience but will be in the region of \$50,000 - \$60,000 p.a. Successful applicants will be given assistance in finding suitable housing for themselves and their families. Interviews will be conducted in late April.

Applications in writing to Charles Allen, Managing Director, Gulf Computing Systems, P.O. Box 396, Barrington, Illinois 60010.



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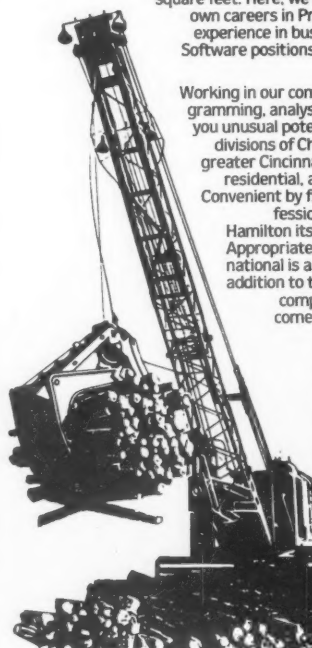
Champion International comprises 4 divisions: Building Products, producer of plywood, paneling, lumber, and other wooden building materials; Champion Papers, manufacturer of high quality printing papers; Hoerner Waldorf, a recent merger, manufacturer of corrugated products; and, Timberlands, manager of our 3.4 million acre timber base, scattered throughout the United States. We are just beginning the most far-reaching expansion program this industry has ever known—part in business expansion, part in modernization of existing operations. Our Hamilton, Ohio, administrative facility, currently being enlarged and updated, will house 230,000 square feet. Here, we offer opportunities for individuals interested in enhancing their own careers in Programming and Analysis. You should have at least 2 to 7 years experience in business applications. ANS COBOL and OS JCL skills are preferred. Software positions exist for programmers experienced in assembler language for OS 370 and minicomputers. A BS degree is required.

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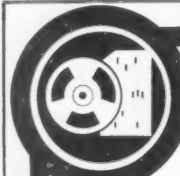
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CHARLOTTE, NC 28202 - J. Schaefer, 1742 Southern Blvd., 704/375-0600  
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Complete benefit package including glide time and tuition reimbursement. Send resume in confidence to:

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Will take systems components (terminals, processors, modems, peripherals, etc.) and software packages, put them into a working system, test the system according to test plans, and insure that system functions to overall specifications. Duties will include measuring systems performance and documenting operating characteristics. Position requires a degree and 5 or more years of experience in real time computer systems and telecommunications.

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## PROGRAMMER ANALYSTS

ITT has recently consolidated its Telecom Switching Division in Johnson City, Tennessee, and has immediate openings for programmer analysts. Experience is required in OS Job Control Language, COBOL Programming with Manufacturing and/or Financial application experience. Hardware is IBM 370-158 MOD 3 AP. A college degree or equivalent work experience is required. ITT North Electric offers a substantial benefit package with starting salary commensurate with work experience. For immediate consideration, send resume to Steve Runyan, ITT North Electric Company, P.O. Box N, CRS, Johnson City, Tennessee 37601.

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## EDP - MICROGRAPHICS

Director - Datacan Operation: 40 hours per week, \$400.00 per week plus profit share and bonus; design and implement a system that will allow a 3M Beta Com to integrate word processing computer alpha-numeric output with output from the Video Digitiser in less than 30 seconds and at 1/10th the market cost; operate Video Digitiser and 3M Beta Com Model 700L, good working conditions, 4 years college with bachelor's degree or equivalent in electronics & electrical engineering, minimum 2 years computer software programming for graphic output, knowledge of graphic capabilities of the 3M Beta Com with emphasis on graphic output.

Contact Mr. Hogan, President, Information Technology, Inc., 154 Wells Avenue, Newton, Mass. (617) 969-2100.

## WANTED

Major expansion of several client companies has created position openings in the following areas:

**SYSTEMS SOFTWARE** - Programmers and Analysts - Salary open.  
**PROGRAMMERS** - COBOL, FORTRAN, ASSEMBLER, PL-1 - 15-25K

**SYSTEMS/ANALYSTS** - Manuf, Fin, Banking - 20-30K  
**COMMUNICATIONS** - Data or Voice - Salary open  
**DATA BASE** - Administrator, Analysts - 25-35K.  
**OPERATIONS RESEARCH** - 18-25K.

These positions are nationwide (literally) and offer attractive benefits and some offer immediate Project management responsibility. If you want a chance to reach your full potential, give me (Jim Mortell) a call or send an updated resume to:

**S. A. Mortell Associates**

312 Governor Place, Allison Park, PA 15101  
(412) 487-6653.



## PROGRAMMER ANALYST

We are seeking an ambitious individual with computer science background or with Manufacturing and/or Accounting Systems experience. Desire PLI, BAL, DOS/VS, DBOMP & on-line programming knowledge. Excellent salary and employee benefits. Send resume with salary history to:



Mr. Joel Burden  
**ALLIS-CHALMERS**  
11 Pine Lake Ave.  
LaPorte, IN 46350  
An Equal Opportunity Employer

## FLORIDA RPGII

**WE OFFER:** Top \$ Salary. Excellent technical growth. Training in System 38's (upon arrival). Relocation assistance.

**WE SEEK:** The best, and only the best, RPGII Programmers. Mail resume including salary history and requirements.

**DYNAMIC CONTROL CORPORATION**  
255 Alhambra Circle # 330  
Coral Gables, FL 33134  
(305) 444-6524

### Chief of Systems and Programming.

City of St. Petersburg, Florida  
Salary \$20,000 to \$25,000

Responsible for the development and implementation of the financial management system project. College degree in Computer Science or Business Administration with four years' experience of increasing responsibility in programming, systems analysis and project management. Experience with IBM Computer Systems and financial applications desired. Send resume to Employment Section, P.O. Box 2842, St. Petersburg, Florida 33731.

A better future begins with a better company.



If you are looking for more than just another job, consider a career with Storage Technology Corporation.

We are the world's largest manufacturer of high density tape data storage products and a major manufacturer of disk subsystems.

Located in the Denver-Boulder area near the majestic Rockies, STC gives you the lifestyle and opportunity you've been looking for. We have rapid, stable growth that gives you greater opportunity for advancement and that means a better future.

Here are some immediate openings to put you in a better position:

**Hardware/Software Specialist**  
Plan, coordinate and implement STC's future directions in the utilization of mainframes and minicomputers for business, manufacturing and engineering applications. Requirements are: complete knowledge of 370/303K mainframes and operating systems, data communications hardware and software as well as mini-computer based distributed systems. Must be a self starter with experience to conceive innovative solutions to complex problems. Ability to interface with executive management very desirable.

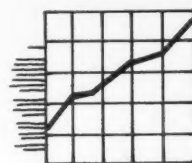
**DEC-10 Systems Programmer**  
Work on the DEC side of a dynamic multi-vendor commercial environment using multiple 1090's. We require monitor or utility experience. Currently using 10 billion disk blocks, almost 200 terminals, with 603, DECNET and DBMS-10.

**Systems Programmer**  
IBM 370 & 303K - heavy VSI, VM & MVS experience on 370/158 or larger. Must function effectively in a multi-vendor, multi-mainframe environment. Networking experience a plus.  
**Computer Scientists, Software Engineers**  
Participate in the design and implementation of the next generation C.A.D. system to design integrated circuits. Expertise in the following areas is urgently needed: logic simulation, circuit modeling, logic placement, interconnect routing and logic partitioning.

Send resume in complete confidence to: Dept. CW/4-2 MD 12

**STC**  
STORAGE TECHNOLOGY CORPORATION  
2270 South 88th Street  
Louisville, Colorado 80027  
An equal opportunity employer.

## The ROMAC DIFFERENCE



## Your Learning Curve

It simply means we determine in our interview whether you have a healthy appetite for continued learning to increase the scope of your technical and business knowledge. If so, we make certain the position we place you in offers the right salary plus the right opportunity. That's a Romac difference and the reason so many highly qualified professionals in EDP rely on us.

Call us now for outstanding career opportunities like these representative positions.

Director MIS (Mass.) Mfg/Mktg/Fin Systems ..... \$45,000  
Operations Analyst (Conn.) Hdwr/Sftwr Png. .... \$30,000  
Senior Analyst (Ohio) Bus. Sys.—370/158..... \$25,000  
Systems Programmer (N. Car.) Univac..... \$22,000



**ROMAC & ASSOCIATES**  
Personnel Consultants

Contact Romac Offices In:  
• Atlanta • Dayton • Portland  
• Boston • Fairfield, CT • Rhode Island  
• Buffalo • Hartford • Rochester/Syracuse  
• Charlotte • Philadelphia • Wellesley Hills  
or write William I. Kelly, V.P. Marketing, 125 High Street, Boston, MA 02110

## SYSTEMS ENGINEER ANALYST/PROGRAMMER

Immediate openings exist for all levels providing a challenging career in the design and development of computer controlled systems for automated material handling applications using minicomputers, microprocessors, programmable controllers and other distributed processing techniques.

Experience in process control, data processing, on-line/real-time systems and material handling applications; GA and DEC minis; CONTROL and RSX-11 OS; are a plus.

Requirements are BS or MS in computer science or engineering, math, business with minor in computer science, 1-6 years experience in computer related fields and a good knowledge of FORTRAN.

Send resume with salary history and requirements to R.P. Dentner, Director Employee Relations, Conco Inc., Conco Road, Mendota, IL 61342.



## PROGRAMMER ANALYSTS California

There's a lot going for you in California and it's all good. Good weather, good living conditions, good cultural and leisure time activities and a very good working environment and career growth opportunity with the latest state-of-the-art techniques.

We have a major systems development program in progress that is committed to developing advanced banking systems. Our systems involvement include time-sharing, personnel/payroll, trust and investment systems, commercial loans, mortgage loans, revolving credit, corporate services, international banking, branch automated systems in a highly professional environment. We are seeking PROGRAMMER ANALYSTS who have above-average credentials and would like to embark their careers in our long term banking systems development program.

If your background includes solid COBOL programming experience on large scale IBM equipment with proven design level skills, and you're ready to advance your career in a highly challenging environment then send your resume to:

MS. LIZ WANTUCH, Employment Department CW42  
CROCKER NATIONAL BANK  
155 Fifth Street, San Francisco, California 94103



**CROCKER BANK**  
An Equal Opportunity Employer



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### UNIVERSITY OF MISSOURI HOSPITALS & CLINICS

#### COMPUTER CENTER DIRECTOR

The University of Missouri Hospital and Clinics, a 500 bed teaching hospital with 160,000 out-patient visits, is seeking a Director for the 44 member Computer Department. Candidates must have had management responsibility in an administrative-oriented computer installation of significant size. The Director must be oriented more to the planning and management of administrative services than to technical functions. Candidates should communicate effectively and cooperatively in a professional/academic organization. Knowledge of medical care data processing is essential. Candidates should possess a degree in business administration or computer science or a closely related field. Six years experience in supervision of computer systems development and design is necessary.

APPLICATIONS MUST BE RECEIVED BY MAY 10, 1979.  
Send resume to:

Director  
University Hospital & Clinics  
**UNIVERSITY OF  
MISSOURI-COLUMBIA**  
807 Stadium Road  
Columbia, Missouri 65212  
An Equal Opportunity /  
Affirmative Action Employer

### CICS Systems Programmers

#### San Francisco

Our rapidly growing Bay Area client is seeking an experienced CICS Systems Programmer. Qualified candidates will have at least 4 plus years' experience in Data Processing with at least 2 years in CICS and working experience with VTAM and NCP. IBM software familiarity with OS/VS, DOS/VS, TSO, IMS, VSAM, etc. will be a definite plus.

We are consultants to management. For immediate consideration, please send resume and salary history in confidence to: **Brian S. Horikoshi, Professionals for Computing, One Maritime Plaza, Suite 1350, San Francisco, California 94111, (415) 956-7120.** Employer assumes fee.

professionals  
for computing, Inc.

## The AUGAT Connection

We are a world leader in the design and manufacture of a broad range of electro-mechanical components, services, and precision materials for the electronics industry. Our business is rapidly expanding in the areas of packaging panels, logic design and wiring service, sockets, and accessories for mechanically mounting and electrically interconnecting microcircuits and semiconductors (sales and profits at Augat increased 46% for the year ended December 31, 1978). We recognize that THE KEY TO OUR SUCCESS IS PEOPLE. We are experts in making the right "connections". Our Interconnection Products Division in Attleboro has immediate openings for several key positions. This is your chance to connect with opportunity and success. Excellent salaries, fringe benefits and growth opportunities.

### PROGRAMMERS-- PROGRAMMER/ANALYSTS-- SYSTEMS ANALYSTS

Experience required in one or more of the following areas: COBOL, communications, mini-systems, manufacturing and financial applications.

If you meet the requirements above and want to make the right connection, please send resume and salary requirements, in confidence, to:

Corporate Personnel

**AUGAT**

33 Perry Avenue, Attleboro, MA 02703

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## RSTS/E-BASIC PLUS FLORIDA

Southwest Florida corporation has immediate openings for experienced programmers for a DEC 11/70 timesharing installation. Responsibilities include new software development for both in-house applications as well as OEM systems. Excellent career opportunity in warm climate oriented to tourist activities. Boating, diving, fishing, beach and golf courses abound. Salary open. Send resume to

Systems Interchange Corporation,  
Suite 21,  
660 North Tamiami Trail,  
Naples, Florida 33940

### PROGRAMMER/ANALYST

The College is accepting applications for this professional staff position. Candidates should have a bachelor's degree and two years of experience or the equivalent and should be able to design programs for online systems. RPG II is required and COBOL, FORTRAN and/or BASIC is desirable.

The appointee will work with a small staff in all phases of systems design and programming and may be called upon to operate the computer during peak loads. Salary range is \$12,000 to \$15,000. Benefits include a comprehensive medical plan and TIAA-CREF retirement plan. Travel and shipping allowance, if applicable, will be provided.

Direct inquiries to Mr. Ronald Joseph, Computer Center Director, College of the Virgin Islands, St. Thomas, USVI 00801.  
**AFFIRMATIVE ACTION/  
EQUAL OPPORTUNITY EM-  
PLOYER AND EDUCATOR.**

## APRIL EDP OPPORTUNITIES

We have hundreds of immediate opening positions that could meet your objectives... location; new experience; advancement; more money; change industry; increased responsibility; growth potential; security; challenge, etc. Our client companies (NATIONWIDE) need EDP professionals at all levels - ALL FEE PAID.

- STARTING SALARIES RANGE FROM \$18,000-\$42,000-

Mgrs./IBM System/3-34-38 Project Managers/Leaders  
Mgrs./Financial-Manufacturing Senior System Analysts  
Mgrs./Banking-Retail-Wholesale Programmer/Analysts  
Mgrs./Sftw.-Technical Support Application Programmers  
System (Sftw.) Programmers Scientific/Mini Programmers  
Hardware/Software Analysts EDP Auditors (Mgrs./Supvs.)

### NATIONWIDE - FEE PAID - CONFIDENTIAL

For more information, contact or send resume to:

Mark Fuller

**CADILLAC ASSOCIATES, INC.**  
32 W. Randolph St., Chicago, IL 60601  
(312) 346-9400

**ITT Courier**

## Marketing Manager

ITT Courier Terminal Systems, Inc. is a leading manufacturer of Point-of-Sale and IBM Replacement Computer Terminals. We are currently offering an outstanding opportunity for a qualified Marketing Manager in our Phoenix headquarters.

Applicants should have at least 5 years experience in the computer industry including both direct sales and headquarters marketing. A bachelors degree is required and an MBA is preferred. The position involves pricing and competitive analyses through the gathering of support data. Some interfacing with field personnel and sales training is involved, as well as interfacing with company functional organizations in developing product specifications, program monitoring, etc.

We will offer you an excellent opportunity for growth with our dynamic and progressive corporation. In addition, a competitive salary and outstanding benefits package is provided. To arrange for an interview appointment, please send your resume and salary requirements to:

F. Willes

**ITT Courier Terminal Systems Inc.**

1515 W. 14th St.  
Tempe, AZ 85281

An Equal Opportunity Employer  
In Practice As Well As Principle

## Bank Programmer/Analysts

Zions First National Bank, the second largest bank in the state of Utah, is expanding its professional staff. Openings exist for experienced programmer/analysts interested in personal and professional growth and who want to live and work in one of the finest living environments in the country. The Salt Lake City area, located at the base of the Rocky Mountains, is ideally located for anyone loving the out-of-doors.

You should have two or more years of programming with banking applications using COBOL or BAL on IBM 360/370 computers. OS, CICS, Parvalet or 3600 terminals would be a plus.

Excellent benefit package includes relocation assistance. Please send your resume including salary history in confidence to: **Mr. Dale Hadley, Data Processing Department, 2200 South, 3270 West, Salt Lake City, Utah 84119.**

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## SYSTEMS & PROGRAMMING MANAGER

Opportunity for a seasoned professional, with minimum 3 years experience in the Management of Systems and Programming for a medium to large commercial bank. Systems experience should include OS/VS or DOS; CICS and on-line networks.

Successful applicant will have had significant and demonstrated managerial experience in a well organized, control oriented operation; and will have administered a disciplined project management, planning and control systems.

Excellent salary and paid benefits package. Forward your confidential resume to:

**Employment Manager  
CITY NATIONAL BANK  
Personnel Division  
339 City National Bank Bldg.,  
Detroit, Michigan 48226**

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## SOFTWARE DEVELOPMENT SPECIALISTS

Are you ready to stretch your skills in new software development projects such as graphics, manufacturing systems, and advanced numerical control:

MDSI provides professional challenge in these opportunity areas, and an environment that includes:

- Interactive PASCAL programming
- Structured Analysis and Structured Design
- Machine Independence
- Top down Design and Implementation
- Structured Walkthroughs

These openings provide an opportunity for immediate contribution and long term professional growth. If you have experience in any of the following areas:

- Analysis and design of large software systems
- Software engineering techniques
- Team oriented systems development
- Engineering or manufacturing systems development

You should call COLLECT or send your resume to:

**Dave Taylor  
(313) 995-6140**

**Manufacturing Data Systems Incorporated  
4251 Plymouth Road  
Ann Arbor, Michigan 48105**

**m d s i**

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## DON'T ANSWER THIS AD UNLESS YOU WANT TO JOIN A PROGRESSIVE INSURANCE COMPANY ON THE WAY UP

We are a rapidly growing medium-sized mutual life insurance company in the beautiful rolling hills of Western Pennsylvania. This is a community of 50,000 plus friendly people and within easy drive to all types of recreational activities. The educational systems are excellent. We are recognized in the industry as a leading innovator in the development of modern products for today's needs. We are offering a great opportunity to a progressive minded individual to head our computer operations division. Eligible candidates should be thoroughly experienced in all phases of Data Processing, to include systems design and programming; thorough knowledge of EDP operations and be able to coordinate activities between departments. Should have been involved in at least one major conversion. The opportunity for growth is unlimited for the right individual. Send confidential resume and earnings history to:

**Mrs. Patricia Moore  
Personnel Administrator  
Protected Home Mutual  
Life Insurance Company  
30 East State Street  
Sharon, PA 16146**

## PROGRAMMERS AND ANALYSTS

**Free Employment Service  
Northeast, Southeast & Midwest U.S.**

Scientific and commercial applications • Software development and systems programming • Telecommunications • Control systems • Computer engineering • Computer marketing and support.

Call or send resume or rough notes of objectives, salary, location restrictions, education and experience (including computers, models, operating systems and languages) to either one of our locations. Our client companies pay all of our fees.

**RSVP SERVICES, Dept. C,  
Suite 700, One Cherry Hill Mall  
Cherry Hill, New Jersey 08002  
(609) 667-4498**

**RSVP SERVICES, Dept. C  
Suite 300, Dublin Hall  
1777 Walton Road  
Blue Bell, Penna. 19422  
(215) 629-0595**

**RSVP SERVICES  
Employment Agency for Computer Professionals**

## PROGRAMMER/ SYSTEMS PROGRAMMER

The George Washington University has the following opportunities available for computer professionals:

**PROGRAMMER/COBOL**, two or more years experience with large scale administrative applications.

**SYSTEMS PROGRAMMER**, three to five years of experience with OS/VS 1, VM, CICS and/or IMS experience desired.

Generous benefits including FREE TUITION. Please submit resume and salary requirements to: Employment Division, The George Washington University, 2125 G. Street, N.W., Washington, D.C. 20052.

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**GEORGE WASHINGTON  
UNIVERSITY  
MEDICAL  
CENTER**

## MICHIGAN

A financial holding company located in Central Michigan requires a manager for its banking software systems.

This person must be technically knowledgeable to maintain and develop banking applications on an IBM 370/DOS/VS/CICS computer. Must be proficient in ANS COBOL and have some experience with BAL and on-line banking systems.

The successful candidate will have a complete knowledge of the internal operations of a commercial bank, along with the ability to communicate with the respective user departments.

Qualified candidates should submit a current resume complete with salary history in confidence to:

**Richard Nelson  
CFC Data Corp.  
127 Townsend St.  
Midland, MI 48640**

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## COMPUTER SCIENTIST HOLLINS COLLEGE

Computer Scientist with Master's degree to teach undergraduate courses in computer science and to coordinate academic computer services at private liberal arts college for women.

Send resume and references to **Dean Roberta A. Stewart, Hollins College, Virginia 24020.**

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## ARIZONA/CALIF.

Scientific Programmers  
Scientific Anal./Programmers  
Sr. Scientific Anal./Prog.  
Radar Systems Design & Anal  
Digital Systems &  
Signal Proc.  
Digital Circuit Design  
Microwave & EMI  
Reliability Circuit Analysis  
Microcircuit Design  
Digital Sys & Image Process  
RF Circuit Design  
Circuit Development  
All fees & relocation paid for by client companies

**Dan Pullman (602) 274-5660**

**PULLMAN PERSONNEL  
3003 N. Central, Suite 1706  
Phoenix, Az. 85012**

## SYSTEMS PROGRAMMER

Progressive marketing firm has immediate opening for self-starter willing to accept total responsibility for writing complete accounting package. Potential part-ownership of software research and development firm marketing to Real Estate firms.

Required knowledge of Digital Equipment Co. RSTS-E, Operating Software, COS 500 Dipol program language. Send resume and salary history to S.R. Wicker, P.O. Box 15508, Baton Rouge, LA 70895.

## ENGINEERING

## SYSTEMS ENGINEERS

**Leadership careers with the freedom to succeed.**

Storage Technology Corporation is only 10 years old and already the world's largest manufacturer of high density tape storage products and a major manufacturer of disk subsystems.

We've built our reputation on innovation and advanced technology because we encourage the independent creative contribution of every one of our people. Last year we went over 300 million in revenues, up from 162 million just a year earlier, so we know our philosophy works.

Systems Engineers with STC consult and provide technical support to field sales and marketing. You set your own schedules and prepare your own presentations to meet sales objectives. And as you grow, you have the possibility of relocating to our corporate headquarters in Colorado, or elsewhere if you wish.

**Requirements are:**

- A college degree (or equivalent experience)
- Knowledge of the internals of one or more IBM virtual operating system (MVS, SVS, VSI, VM, DOS/VS)
- High level of proficiency in ALC
- Knowledge of one or more other programming languages (FORTRAN, COBOL, PL/I)
- Ability to write and present technical materials clearly and effectively

If you have these credentials, we have an exceptional career for you at STC.

For fastest consideration with absolute confidentiality send your resume to:

**STORAGE TECHNOLOGY CORPORATION**

Department CW/4-2MD - 38

2270 South 88th Street, Louisville, Colorado 80027

-or-

Give us a call TOLL-FREE at 800-525-2940 for further information.

- Fred Moore ext. 6087
- Bill Waibel ext. 6090

## PROGRAMMER/ANALYST MEDICAL INFORMATION SYSTEM

The Red Cross Blood Services needs a talented computer professional to assist in constructing an integrated information system for the two state Northeast Region. This exciting position will involve specification, development and installation of software for blood collection, laboratory processing, and component management.

Qualified candidates will have 2-3 years' experience and be conversant in two computer languages. Some communications and operating systems exposure would be helpful.

Send resume to Director, Information Services or call 731-2130, Extension 229.



**The American  
Red Cross Blood Services-  
Northeast Region**

812 Huntington Avenue, Boston, MA 02115  
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# Systems Programmer

**With a MITCHELL staff position...  
you're on a springboard to  
higher responsibilities!**

Way to go. When you make your first big move forward to Mitchell — one of the Southwest's most aggressively expanding real estate and energy development companies.

Responsibilities will range over assisting with evaluation and recommendation of computer software, installation and testing, and assessing ultimate performance of software. You'll also be in charge of troubleshooting software problems, and recommending and maintaining production JCL and JCL standards.

On a still larger scale of opportunity, you'll have every chance to work with the Supervisor of Systems Programming, and share in the installation of IDMS with CICS interface.

Degree preferred. Required experience is 1 year as software programmer working in a DOS/VS operating system, Sysgen, ALC, JCL and CCBOL. Knowledge of ETSS, CICS, IDMS, VM/370 helpful.

Successful applicant will be immediately assigned to our state-of-the-art EDP environment in our new corporate headquarters in The Woodlands...a 20,000 acre planned new town that is ideally located 28 miles north of downtown Houston on I45; there to be joined in 1980 by the entire Mitchell Energy organization.

Excellent starting salary and equally attractive benefits package. Send resume, in confidence, with salary history and present requirements, or call Karen Filkins at (713) 224-4522.



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DEVELOPMENT CORP.**  
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Houston, Texas 77002

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DATA PROCESSING

# ANALYSTS

Kaman Sciences is a diversified corporation involved in computer systems and services, high technology sensors and systems and scientific research and development.

Located in the scenic Pikes Peak-Colorado Springs area, Kaman offers these challenging opportunities:

## SENIOR SYSTEMS ANALYST

Immediate requirement for a Project Leader for Mini-Computer Systems Development, involving design responsibility and project monitoring in a "deadline" environment. Background in Computer Science/Math/Macro Economics, plus experience in DEC 11/70 essential. Should have 3-5 years experience implementing applications programs on minis.

Should also be familiar with COBOL/Macro/FORTRAN/Basic/IAS/Utilities/Overlays/Operating Systems and DBMS II. Must be willing to travel.

## PROGRAMMERS/ANALYSTS

Immediate requirements for highly productive self starters to participate in development of applications systems on interactive, terminal-oriented DEC PDP 11/70 minicomputer. Desire BS in Math/Computer Science/Physics. 1 to 4 years experience in combination of IAS/DBMS-11/DECNET/Structural Programming/Long Range Planning. Languages: COBOL/MACRO II Assembler.

Kaman offers excellent company benefits and competitive salaries. Please send resume in complete confidence to:

**KAMAN SCIENCES CORPORATION**

Attn: FD  
P.O. Box 7463  
Colorado Springs, Colorado 80933

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## MICHIGAN

and

OH, IND, IL, WIS

Being SELECTIVE doesn't help! We still have TOO MANY GOOD\* openings to list in a 2" ad. But here's a peek: Systems Programmers - to \$30K  
Programmers/Analysts - to \$28K  
N/C or Real-time Software - to \$26K  
\* We Selected them.

**SELECTIVE RECRUITING ASSOCIATES**  
3001 S. State St.  
ANN ARBOR, MI 48104  
Phone: (313) 994-5632  
Resumes or call collect to C.W. Page

## DATA GENERAL HARDWARE ENGINEER

Min. 2 yrs. exp. Eclipse line including Peripherals - will supervise Junior Engineer in maintenance and development or large on-line Hospital System located in Washington D.C. Salary \$30K. Call John Perez collect: (202) 625-7754

## PROGRAMMER/ ANALYST

Central Mass. automotive hardware distributor has immediate opening for programmer/analyst experienced with 370 DOS/VS. CICS helpful. 4300 Series currently on order. Join the team at this growing company. Excellent benefit package.

Call or send resume with salary requirements to Personnel Dept.

**JOSEPH LEAVITT CORP.**  
1062 Millbury St.  
Worcester, Mass. 01607  
(617) 757-6341

## PROGRAMMERS ANALYSTS

Take advantage of the most individualized job search available in the D.P. industry today. You pay absolutely NO fee for our service. We search out the best opportunities nationwide to fit your earnings & growth potential with respect to your location requirements. In confidence, send us your resume.

**SEARCH E.D.P., INC.**  
3152 Linwood Ave.  
Cincinnati, Ohio 45208  
All replies answered

# PROGRAMMERS PROGRAMMER/ANALYSTS SYSTEMS ANALYSTS

Advance Your Career

In a Truly

State-of-the-Art Environment

Blue Cross/Blue Shield of Virginia, located in beautiful and historic Richmond, has one of the Southeast's most sophisticated DP Installations. It includes IBM 3032, IMS/VS, COBOL, TSO, BATCH, and teleprocessing systems.

The expansion of our operations has created exceptionally challenging and rewarding projects and opportunities for software professionals with 2 or more years of programming experience, preferably in a health care environment. College degree is not necessary.

With Blue Cross/Blue Shield of Virginia, you'll not only enjoy ongoing opportunities for professional advancement and an ideal location, but also an excellent salary and benefits program. For immediate consideration, send your resume to:

John Bergeron



**Blue Cross  
Blue Shield  
OF VIRGINIA**  
P.O. Box 27401

Richmond, Virginia 23279

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# PROGRAMMER

Are you an experienced  
RPG II programmer

Company headquartered in City of Industry, Calif., has immediate growth opportunity. Excellent pay and fringes.

Please call (213) 962-3661 or apply in person.

# HOLLYTEX CARPET MILLS

300 N. Baldwin Park Blvd.  
City of Industry, Calif. 91749

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## COMPUTER SERVICES

### CUSTOMER SERVICE REPRESENTATIVE

Our APL Timesharing Division is in a dynamic growth phase and seeks applicants that can "make it happen."

We are currently offering a unique opportunity for a customer oriented individual with on-line systems experience.

Responsibilities would include all phases of account management from system demonstration to start-up and on-going support and maintenance.

If you are interested in learning more about this opportunity please send a resume and earnings history to S. Cantrell, The Computer Company, 1905 Westmoreland St., Richmond, Virginia 23230. or call collect (804) 358-2171, ext. 501.



All replies are considered confidential. We are an equal opportunity employer.

**THE COMPUTER COMPANY**

## HOSPITAL PROGRAMMER/ANALYST

We are considered to be one of the leaders in hospital data processing. We currently are operating with an IBM 3031 CPU, under CICS/VS, DL/I and VSAM. We have over 150 on-line devices and are supporting two remote hospitals and one local. The person we are looking for should have at least two years of CICS and DL/I experience, preferably in a hospital environment and be familiar with data base design. Send confidential resume to: Employment Coordinator, Personnel Department, Baptist Medical Center, Baptist Medical Center Plaza, 9601 I-630, Exit 7, Little Rock, Arkansas 72201.

Equal Opportunity Employer

# WHAT DO THE ROYAL HONG KONG JOCKEY CLUB AND AMERICA'S LEADING DEPARTMENT STORES HAVE IN COMMON?

The answer is simple. Both use systems developed specifically for them by divisions of the Data Systems and Services Group of General Instrument Corporation, a "Fortune 500" company.

Our Business Systems Division develops, supplies and supports POS (Point-of-Sale) systems under the trade name Unitote/Regitel. We have installed more of these systems in the country's 100 largest department stores\* than IBM or NCR.

American Totalisator Systems has emerged as a leader in the rapidly growing business of off-track betting, automated lotteries, and overseas wagering systems.

Both divisions have experienced an increase in business and require additional programming professionals.

We work with state-of-the-art hardware and software using high level programming languages to create and produce our real-time, on-line transaction processing systems. Work on either a POS or a wagering system includes the total development of a system, from the formation of the system specification to the system design, program preparation and system installation.

The Data Systems and Services Group offers liberal compensation, comprehensive company-paid benefits, including a tuition plan, and a relaxed and informal working environment.

If you have either a strong programming experience or a B.S. degree in an applicable area, consider yourself above average in technical competence, and want to participate in creating our next generation of systems, call Ms. Deborah Lindsey COLLECT at (301) 66-8700 or send your resume in confidence to:



**GENERAL INSTRUMENT CORPORATION**  
DATA SYSTEMS AND SERVICES GROUP

11126 McCormick Road, Hunt Valley, Maryland 21031

\* as defined by NRMA

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## SDC Integrated Services, Inc.

### SENIOR SYSTEMS ANALYST Opportunity in NEW ORLEANS AREA with SDC, Integrated Services, Inc. at NASA's Slidell Computer Complex

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These opportunities offer excellent growth potential, a challenging environment & an outstanding salary & benefits package. Submit resume & salary history in confidence to:

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- PROGRAMMER/ANALYSTS
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We offer a salary commensurate with your experience in addition to a full benefits package which includes tuition reimbursement and dental insurance.

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**Senior Systems Programmer**  
This position requires experience with SVS or MVS operating system generation. Detailed activities will include installation and maintenance of new and existing systems. Experience in telecommunication implementation. You must have a minimum of 2 years in systems software programming, a thorough knowledge of assembler language and PL/I or COBOL. Refer to position AR #214.

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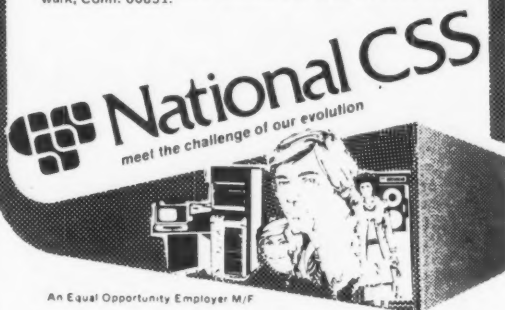
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**Request for Proposal No. 440** due 3:30 p.m., Wednesday, April 25, 1979, for the acquisition of a minicomputer to facilitate data acquisition and control of a potentiostat in the study of the anti-corrosive properties of iron-phosphide.  
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**Request for Proposal No. 442** due 3:30 p.m., Wednesday, April 25, 1979, for the acquisition of TTY compatible CRT's ranging in price up to \$1,000.  
**Request for Proposal No. 443** due 3:30 p.m., Thursday, April 26, 1979, for the acquisition of a minicomputer to be used in a medical laboratory environment for record keeping and retrieval and word processing functions.  
**Request for Proposal No. 444** due 3:30 p.m., Thursday, April 26, 1979, for the acquisition of a news editing system including hardware and software to teach journalism students at a state university story preparation and editing as practiced in current newspaper environments.  
Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.  
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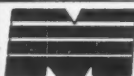
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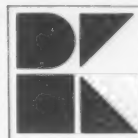
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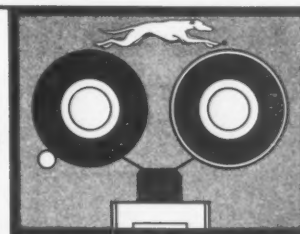
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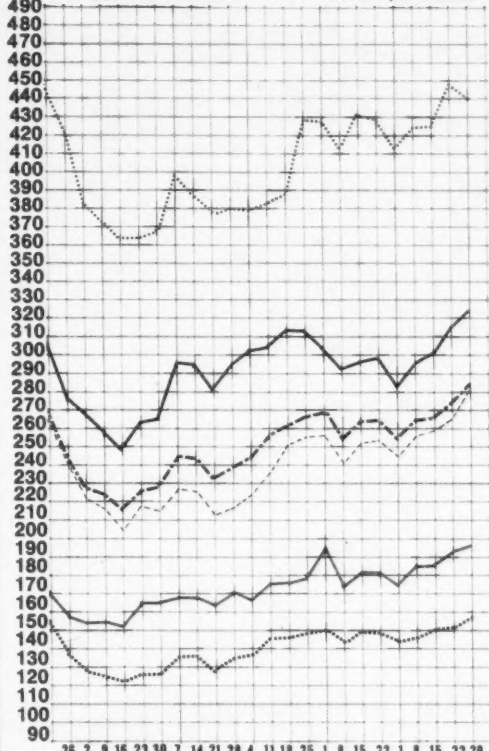
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Revenue	17,550,543	15,961,598
Earnings	1,222,148	a794,409

a-Restated.

### DIGICON

	1978	1977
Shr End	\$ 0.03	\$ 0.02
Revenue	9,063,000	6,724,000
Tax Cred	.....	53,000
Earnings	48,000	34,000
6 Mo Shr	21	20
Revenue	10,747,000	14,192,000
Tax Cred	.....	182,000
Earnings	426,000	404,000

### MICROFORM DATA SYSTEMS

	1978	1977
Shr End	\$ 0.07	\$ 0.07
Revenue	\$6,325,300	8,508,300
Tax Cred	.....	179,900
Earnings	a(3,541,400)	382,100
6 Mo Shr	23	23
Revenue	11,699,700	16,510,700
Tax Cred	.....	599,400
Earnings	a(4,083,000)	1,266,400

a-Reflects provision for doubtful accounts in the amount of \$1,435,900 and charge of \$536,000 from the write-off of capitalized software.

### MINI-COMPUTER SYSTEMS

	1978	1977
Shr End	\$ 1.12	\$ 1.12
Revenue	\$4,498,000	3,627,000
Earnings	(32,000)	102,000

### APPLIED DATA RESEARCH

	1978	1977
Shr End	\$1.41	\$1.19
Revenue	22,627,238	18,930,241
Disc Op Loss	2- 4	2 7/8
Earnings	1,976,591	1,636,531
3 Mo Shr	53	34
Revenue	7,725,105	4,912,003
Disc Op Loss	.....	(84,617)
Earnings	743,689	563,972

## Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, MARCH 28, 1979

All statistics compiled, computed and formatted by TRADE QUOTES, INC. Cambridge, Mass. 02139

E X C H	PRICE					E X C H	PRICE					E X C H	PRICE				
	1978-79 RANGE (1)	CLOSE MAR 28 1979	WEEK NET CHNGE	WEEK PCT CHNGE	1978-79 RANGE (1)		CLOSE MAR 28 1979	WEEK NET CHNGE	WEEK PCT CHNGE	1978-79 RANGE (1)	CLOSE MAR 28 1979		WEEK NET CHNGE	WEEK PCT CHNGE			
COMPUTER SYSTEMS																	
A ARCADIA CORP	28- 69	38 7/8	+ 1/8	+0.3	O ADVANCED COMP TECH	1- 2	7/8	+ 1/8	+16.6	O DATA ACCESS SYSTEMS	3- 14	9	- 1/2	-5.2			
N BARRON'S CORP	59- 87	71 3/8	+1 7/8	+2.6	O ANACOMP INC	8- 22	17 3/8	+ 1/8	+0.7	A DATA PRODUCTS CORP	14- 25	18	+ 3/8	+2.1			
O COMPUTER AUTOMATION	15- 44	15 1/2	- 7/8	-33.3	A APPLIED DATA RES.	8- 17	11 1/2	+ 5/8	+5.7	O DATUM INC	2- 6	2 3/4	+ 1/8	+4.7			
N CONTROL DATA CORP	23- 44	33 7/8	+ 3/8	+1.1	N AUTOMATIC DATA PROC	24- 36	31	+1 1/4	+4.2	N DECISION DATA COMPUT	2- 6	4	+ 3/8	+10.3			
O CRAY RESEARCH INC	8- 33	26	+ 1/2	+1.9	O COLEMAN AMERICAN COS	1- 2	5/8	0	0.0	O DELTA DATA SYSTEMS	1- 1	3/8	0	0.0			
N DATA GENERAL CORP	42- 71	65 1/4	+ 3/4	+7.3	O COMPU-SERV NETWORK	5- 12	8 3/4	+ 3/4	+9.3	A DECORATION INC	6- 34	22 1/2	+ 5/8	+13.2			
N DATAPoint CORP	34- 80	80 1/4	0	0.0	O COMPUTER HORIZONS	1- 9	0	0	0.0	O DATARUM CORP	6- 32	18	+1 1/2	+9.0			
N DIGITAL EQUIPMENT	39- 58	55 1/4	+1 3/4	+3.2	O COMPUTER NETWORK	5- 16	7	+1 1/8	+19.1	N ELECTRONIC M & M	4- 9	6 3/8	0	0.0			
N ELECTRONIC ASSOC.	2- 13	6 3/4	- 1/8	-1.8	N COMPUTER SCIENCES	8- 17	12 1/2	+1 5/8	+14.9	O FABRI-TEK	1- 2	3/4	0	0.0			
A ELECTRONIC ENGINEER.	9- 19	10 7/8	- 5/8	-5.4	O COMPUTER TASK GROUP	1- 5	4 3/4	0	0.0	O GENERAL COMPUTER SYS	1- 3	2 3/8	+ 1/8	+5.5			
N FOUR-PHASE SYSTEMS	19- 40	36 1/4	+2 3/4	+8.2	O COMPUTER USAGE	2- 4	2 7/8	- 1/8	-4.1	O GENERAL DATACOM IND	9- 21	16 3/4	+ 3/4	+4.6			
N FOXBORO	28- 40	32 1/2	+ 1/4	+0.7	C COMPUT AUTO REP SVC	4- 10	8 5/8	- 1/8	-1.4	N HAZELTINE CORP	10- 17	15 1/4	0	0.0			
O GENERAL AUTOMATION	7- 26	14 3/4	+ 1/4	+1.7	O COMSHARE	6- 22	22	+2 1/4	+11.3	N HARRIS CORP	17- 36	27 3/4	+1	+3.7			
O GRI COMPUTER CORP	1- 3	2	0	0.0	O CULLITANE CORP	14- 33	22 3/4	+1 1/2	+7.0	O INFORC INC	6- 11	8 3/4	+ 5/8	+7.6			
N HEWLETT-PACKARD CO	62- 96	95 5/8	+3 5/8	+9.9	O DATA DIMENSIONS INC	4- 9	5 1/2	- 1/4	-4.3	O INFORMATION INTL INC	7- 12	11 1/2	+1 3/4	+20.5			
N HONEYWELL INC	43- 76	68	+2 5/8	+4.0	O DATATAB	1- 4	3 1/4	- 1/8	-3.7	O INFOTON	1- 3	3 3/4	+ 5/8	+9.0			
N IBM	236-321	317 3/4	+1 3/4	+0.5	N ELECTRONIC DATA SYS.	15- 25	19 5/8	- 1/8	-3.6	O INTEL CORP	39- 64	64	+2	+3.2			
O MANAGEMENT ASSIST	9- 29	24	+1 1/2	+6.6	O INSYTE CORP	1- 3	1 1/8	0	0.0	O INTERSIL	7- 18	12 1/4	-1 3/8	-10.0			
O MANUFACTURING DATA S	9- 25	23 7/8	+2 3/4	+13.0	O IPS COMPUTER MARKET.	2- 3	3	+ 1/4	+9.0	A LUNDY ELECTRONICS	4- 8	5 3/8	+ 3/8	+7.5			
O MICRODATA CORP	10- 23	22 5/8	+ 1/4	+1.1	O KEANE ASSOCIATES	3- 6	5 3/4	+ 3/4	+15.0								
SOFTWARE & ERP SERVICES																	
C MINI-COMPUTER SYST	4- 8	4 3/4	0	0.0	O KEYDATA CORP	1- 3	3	+ 3/4	+33.3	O MSI DATA CORP	10- 19	10 1/8	- 1/8	-1.2			
O MODULAR COMPUTER SYS	7- 18	15 1/2	-1	-6.0	A LOGICON	10- 19	13 3/4	+ 7/8	+6.7	N MEMOREX	27- 59	34 1/2	+2	+6.1			
N NCR	37- 72	71 1/2	+6	+5.9	A NATIONAL CSS INC	15- 46	45 5/8	+15 1/2	+51.4	N MOHAWK DATA SCI	6- 15	11 3/4	+ 1/2	+4.4			
N PRIME COMPUTER INC	20- 43	35	+3 7/8	+12.4	O NATIONAL DATA CORP	7- 13	10 3/4	+ 3/4	+7.5	O OREX	2- 6	7 1/2	+1 1/2	+25.0			
N PERKIN-ELMER	17- 33	32 5/8	+1 3/8	+4.3	A ON LINE SYSTEMS INC	12- 30	21 3/4	+1 3/4	+8.7	O PARADYNE CORP	9- 17	16	+2 3/8	+17.4			
N SPECTRA RAND	33- 69	49 1/8	+1 7/8	+3.9	N PLANNING RESEARCH	4- 10	5 7/8	- 1/8	-2.0	O PENRIL CORP	5- 12	10 5/8	+ 7/8	+9.9			
A SYSTEMS ENG. LABS	11- 24	16 3/4	+1 1/2	+9.8	O PROGRAMING & SYS	1- 1	1	0	0.0	N PERTEC CORP	9- 17	9 5/8	+ 5/8	+6.5			
O TANDEN COMPUTERS INC	13- 37	29 3/4	+3	+11.2	O RAPIDATA INC	3- 7	5 7/8	+ 5/8	+11.9	A PUTTER INSTRUMENT	2- 2	1 3/4	0	0.0			
A WANG LABS.	12- 43	42 5/8	+6 1/4	+17.1	O REYNOLDS & REYNOLD	18- 36	30 1/4	+ 1/4	+0.8	O RECOGNITION EQUIP	7- 13	8 5/8	+ 1/2	+6.1			
LEASING COMPANIES																	
C BOOTHIE COMPUTER CORP	13- 21	18 1/4	+ 1/4	+1.3	O SCIENTIFIC COMPUTERS	3- 9	6 3/4	- 3/8	-5.2	O SCAN DATA	1- 6	2 5/8	+ 1/4	+10.5			
C COMUSCO INC	3- 10	10	+ 1/2	+2.8	O TMSHARE INC	18- 41	36 3/8	+ 3/4	+2.0	N STORAGE TECHNOLOGY	19- 46	38 1/4	+ 1/8	+3.3			
A COMMERCE GROUP CORP	1- 1	1/4	0	0.0	A URS SYSTEMS	5- 8	6 1/8	- 1/4	-3.9	O T BAR INC	11- 21	19 1/4	- 3/4	-3.7			
A COMPUTER INVSYS GP	1- 7	3 3/8	- 1/4	-12.9	N WLY CORP	1- 7	5 1/2	+ 1/4	+4.7	O TALLY CORP.	4- 14	11 1/2	+ 3/4	+6.9			
C CONTINENTAL INFO SYS	5- 15	8 1/2	+ 1/4	+3.0						A YEC INC	6- 13	6 7/8	- 1/8	-1.7			
N DATARUM RENTAL	1- 3	3	0	0.0						N TEKTRONIX INC	33- 57	55	+ 1/4	+3.4			
A DCL INC	3- 5	4 1/4	+ 1/4	+6.2						N TELEX	3- 9	5 3/4	+ 1/4	+4.5			
N JRF INC	8- 16	11 5/8	0	0.0						O TESOMA SYSTEMS CP	9- 23	14 3/4	+ 1/4	+1.7			
N ITFL	16- 36	22 1/2	+ 5/8	+9.8						O WILTEK INC	1- 2	3/4	+ 1/8	+20.0			
N LEASCO CORP	24- 41	39 7/8	+ 3/8	+0.9													
O LEASPCAP CORP	1- 4	1 3/4	- 1/2	-22.2													
A PIONEER TEX CORP	3- 7	3 1/4	- 1/4	-7.1													
N U.S. LEASING	13- 23	14 7/8	0	0.0													
PERIPHERALS & SUBSYSTEMS																	
C BOOTHIE COMPUTER CORP	13- 21	18 1/4	+ 1/4	+1.3	N ADDRESSOGRAPH-MULT	14- 32	20 1/8	+ 7/8	+4.5	A AMERICAN BUS PRODS	6- 11	9 1/2	+ 1/2	+5.5			
C COMUSCO INC	3- 10	10	+ 1/2	+2.8	N AMPLEX CORP	10- 19	16 1/4	- 1/8	-0.7	O BALTIMORE BUS FURMS	1- 4	1 1/2	0	0.0			
A COMMERCE GROUP CORP	1- 1	1/4	0	0.0	O ANDERSON JACOBSON	5- 10	7 7/8	+ 7/8	+12.5	N BARRY WRIGHT	14- 34	15 3/4	+ 7/8	+5.8			
A COMPUTER INVSYS GP	1- 7	3 3/8	- 1/4	-12.9	N APPLIED DEC DATA SYS	2- 12	9 7/8	0	0.0	O CYBERMATICS INC	1- 1	3/4	0	0.0			
C CONTINENTAL INFO SYS	5- 15	8 1/2	+ 1/4	+3.0	O BEEHIVE INTL	3- 7	4 5/8	+ 1/4	+6.2	O DUPLEX PRODUCTS INC	13- 30	19	- 3/8	-1.4			
N DATARUM RENTAL	1- 3	3	0	0.0	A BULT, BERANEK & NEW	6- 14	12	- 5/8	-4.9	N ENNIS BUS. FURMS	8- 19	18 3/4	0	0.0			
A DCL INC	3- 5	4 1/4	+ 1/4	+6.2	A BUNKER-RAMU	10- 22	21 3/8	0	0.0	N 3M COMPANY	43- 66	58 3/4	+ 3/4	+1.2			
N JRF INC	8- 16	11 5/8	0	0.0	C CALKEE	3- 13	10 1/8	+1 1/8	+22.7	O MOORE CORP LTD	28- 34	33 3/4	+2	+6.2			
N ITFL	16- 36	22 1/2	+ 5/8	+9.8	N CAIRIDGE MEMORIES	3- 12	5 7/8	+1 1/2	+7.7	N NASHUA CORP	18- 37	27 7/8	- 3/8	-1.5			
N LEASCO CORP	24- 41	39 7/8	+ 3/8	+0.9	N CENTRONICS DATA COM	16- 40	39 3/4	+ 3/4	+1.9	O STANDARD REGISTER	20- 27	24 3/4	+ 1/4	+1.0			
O LEASPCAP CORP	1- 4	1 3/4	- 1/2	-22.2	C COGNITRONICS	1- 4	1 5/8	+ 1/8	+1.3	A TAB PRODUCTS CO	8- 16	13	+ 1/2	+4.0			
A PIONEER TEX CORP	3- 7	3 1/4	- 1/4	-7.1	O COMPUTER COMMUN.	6- 10	8 7/8	- 3/8	-4.2	A WABASH MAGNETICS	10- 22	16 5/8	+1 1/4	+8.1			
N U.S. LEASING	13- 23	14 7/8	0	0.0	A COMPUTER CONSOLES	4- 11	10 7/8	- 1/2	-7.7	N WALLACE BUS FURMS	10- 33	25 1/4	- 3/8	-1.4			
					A COMPUTER EQUIPMENT	3- 6	4 7/8	- 1/4	-4.8								
					O COMPUTER TRANSCIVER	1- 5	3 1/4	+ 3/8	+13.0								
					C COMPUTEVISION CORP	9- 47	46 1/2	+2 1/4	+5.2								
					O CONTECH CORP	6- 24	34	+ 1/2	+1.5								
					N CONRAC CORP	13- 26	15 5/8	+ 3/4	+5.0								
SUPPLIES & ACCESSORIES																	
A AMERICAN BUS PRODS	6- 11	9 1/2	+ 1/2	+5.5													
O BALTIMORE BUS FURMS	1- 4	1 1/2	0	0.0													
N BARRY WRIGHT	14- 34	15 3/4	+ 7/8	+5.8													
O CYBERMATICS INC	1- 1	3/4	0	0.0													
O DUPLEX PRODUCTS INC	13- 30	19	- 3/8	-1.4													
N ENNIS BUS. FURMS	8- 19	18 3/4	0	0.0													
N 3M COMPANY	43- 66	58 3/4	+ 3/4	+1.2													
O MOORE CORP LTD	28- 34	33 3/4	+2	+6.2													
N NASHUA CORP	18- 37	27 7/8	- 3/8	-1.5													
O STANDARD REGISTER	20- 27	24 3/4	+ 1/4	+1.0													
A TAB PRODUCTS CO	8- 16	13	+ 1/2	+4.0													
A WABASH MAGNETICS	10- 22	16 5/8	+1 1/4	+8.1													
N WALLACE BUS FURMS	10- 33	25 1/4	- 3/8	-1.4													

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH  
L=NATIONAL; M=MOBILE; O=OVER-THE-COUNTER  
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID  
(1) TO NEAREST DOLLAR

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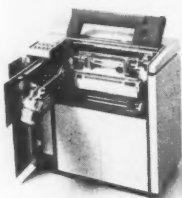
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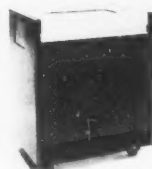
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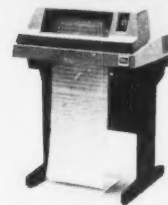
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